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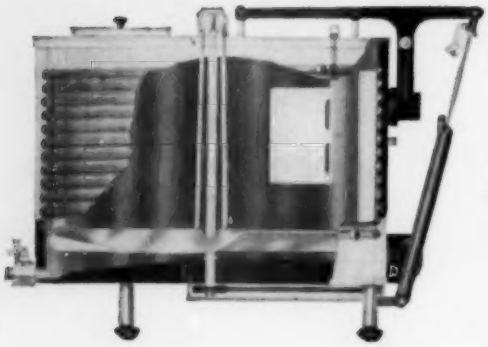

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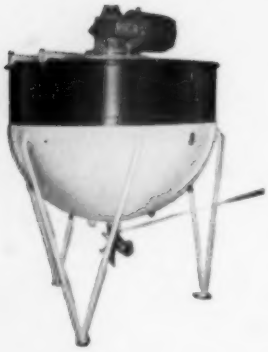

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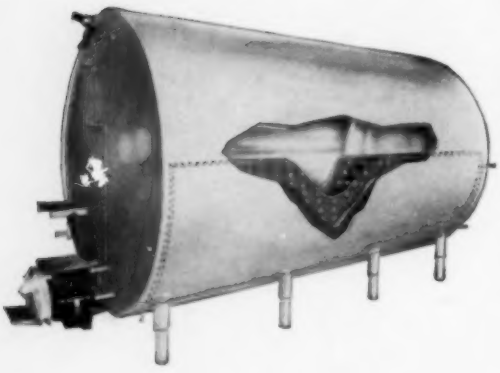

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EDITORIAL

Relationships and Similarities of the Pharmaceutical and Food Industries[a]

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(Received for publication, May 29, 1950)

It is interesting to make comparisons between the pharmaceutical and food industries, because a study of the problems indicate both close similarities and wide divergences. We often travel closely parallel paths, and by processes sometimes obscure we have often learned valuable lessons from each other.

If for no other reason, we are alike in the attention we must give to the numerous problems we constantly face relating to public health. Our responsibility to the consumers of our products can never be crowded from our minds by other less worrisome and more attractive considerations.

Many efforts have been made to define clearly what a food is and what a drug is. Some of the attempts have been pretty good. The trouble in framing the definitions has always come at the places where the two meet. Difficulty in this borderline area is to be expected. Today it is this borderline area which interests me most because some of the most enlightening relationships are illustrated there.

We could hardly mention foods and drugs in the same breath without thinking about developments in the vitamin field during the past 30 or 40 years. Two centuries ago the rich, in their ignorance, over-ate on a diet consisting of meats, pastries and wine. The poor, in their poverty, existed on bread, bacon, cheese and beer. Fruits, vegetables and milk entered the diet only gradually and only in comparatively recent times.

On the meat, bread, cheese and beer diet of two centuries ago people began to recognize definite deficiency patterns and the foods which prevent them, but real progress has been made only in our day. Lemon juice for scurvy was prescribed for the British navy in the 18th century. But chemical isolation of vitamin C was not achieved until about 1930. As recently as the 1920's we were talking just of vitamins A, B and C. Then vitamin D was pried loose from fat-soluble vitamin A, and vitamins E and K later made their appearance in the fat-soluble class. Water-soluble vitamin B has blossomed into a complex whose entire nature we have not yet determined. Vitamin C has remained just vitamin C.

Although nutritional experts have done much to educate us to a balanced diet, the sale of vitamins as pharmaceuticals has earned an assured place. Man in these days frequently is a sedentary animal. His caloric requirements, therefore, are often satisfied by three relatively small meals a day, which do not supply an optimal vitamin intake. It is now an established practice to supplement the diet with additional vitamins in pure form or in concentrates purchased from the drug store. The circle is completed by the food industry, which now enriches flour, margarine and other foods with pure vitamins from the factories of the pharmaceutical manufacturer.

Do you remember those days back in the 1920's, too, when hope dawned for those who suffered from pernicious anemia? Raw liver was the answer. If only the patient would eat a half-pound or so of raw liver every day of his life, he would probably get along very well. But, grateful as they were, patients could tolerate such a diet only so long. It was not long before chemists in the laboratories of the meat packers and the pharmaceutical manufacturers had provided relief in the form of a liver extract that could be injected painlessly at convenient intervals.

We have gone along rather well with liver extract these last 25 years. But now the combined efforts of the chemists and the microbiologists have brought us pure crystalline vitamin B_{12}. On a weight basis this is the most active physiologic substance known. Again, drug and food scientists are collaborating in this borderline problem, and the mysteries of pernicious anemia and its treatment may soon be a thing of the past. Furthermore, vitamin B_{12} is showing great promise as an important growth factor for both animals and human beings.

The safety of our products in the hands of the ultimate consumer is of concern to all of us. In research in this field the pharmaceutical industry has of necessity had a head start, because so many drugs are foreign to physiological processes; but the food industry is coming along fast. One reason for the time difference has been the difference in legal requirements imposed. Since 1938 we have been accustomed to filing with the Food and Drug Administration new drug applications on all of our new products, with complete data which showed the safety of the drugs in human patients. We have followed a prescribed routine in shipping new drugs only to competent investigators who help us determine safety.

The food industry is just getting to this point. Until just recently it has been illegal, really, for you to ship for experimental purposes across state lines foods containing ingredients not provided for in identity standards. But now, at the instigation of your representatives, the FDA has established a permit system

[a] Presented at the Tenth Annual Meeting of the I. F. T., Chicago, Illinois, May 22, 1950.

by which you may ship these foods for studies such as are carried out on drugs.

By the very nature of the substances which are interesting as drugs, — substances that have high physiological activity, — the pharmaceutical manufacturers have had the safety problem facing them for a long time. It is only now that food manufacturers are meeting these problems with any frequency. More and more chemical ingredients have gained attention as possible food ingredients because of attractive properties—propionates as mold inhibitors in bread, monosodium glutamate for enhancing the flavor of foods, and so on.

The difference in the approach to the problem of safety by the two industries is well illustrated by an experience with a surface-active agent. The chemical manufacturer engaged a pharmacologist to make an extensive study of this type of material in experimental animals. After years of work he concluded that the agent was substantially nontoxic when given by mouth. At this time we became interested in it as a drug because it showed promise of benefiting patients who were unable to absorb dietary fat because of some abnormality of the intestinal tract. When this surface-active agent was taken with the meal, it emulsified dietary fat so that it was readily absorbed by the faulty intestine. On the basis of the toxicity studies carried out by the pharmacologist, we were able to market the material with assurance that it was safe for drug use.

More recently, however, surface-active agents of this same type have attracted attention as softening agents for bread. You are probably all aware, from reports in trade publications, that testimony on this type of ingredient has run to thousands of pages at food standards hearings conducted by the FDA. This points up the difference in the problem as it is faced by our two industries. I do not mean to imply that pharmaceutical manufacturers do not have quite a job on their hands in establishing the safety of drugs. We do. Sometimes we spend years completing the necessary data. But you have an even bigger job. It is the position of the Food and Drug Administration that the scientific work necessary to establish the safety of a food ingredient will usually be more extensive than that necessary to support a new drug application. While a drug will have limited use under certain prescribed conditions, a food ingredient may be used in a wide variety of foods which are consumed in varying amounts by all classes of people in varying stages of health and throughout their life time.

For this reason and for other reasons, some of them unfortunately political, it has been proposed recently that the Food, Drug, and Cosmetic Act should be amended to provide for a new food ingredient application similar to the present new drug application. The proposal merits the most careful consideration to determine its practicability. The ethical firms in the food industry, of course, wish to do everything possible to protect the public health. There is plenty of evidence for this. Witness the quick cooperation given by the food industry in eliminating the use of the Agene process for aging and bleaching flour because of adverse findings in experimental animals, even though no deleterious effects in human beings have ever been demonstrated.

Your industry is now engaged in contributing to the public safety by participation in the FDA hearings on insecticide residues on fresh fruits and vegetables. The amount of time and effort which must go into the presentation of complete data at an extended hearing such as this would be hard to estimate. Nevertheless, I can imagine that you are going to give whole-hearted cooperation to the investigation, so that the necessary safeguards surrounding the use of insecticides on food crops can be established.

Perhaps an illustration can be given of how the pharmaceutical manufacturer must employ restraint where a question of public safety is involved in the use of new chemical substances. For a number of years we have carried on investigations on a new synthetic sweetening agent, with no caloric value. It should be of considerable interest to diabetics and to other patients who must restrict their intake of sugars. It offers two advantages: it has no bitter after-taste, and it does not decompose in boiling solutions. It may therefore be used in cooking and baking. While it is many times sweeter than sugar, it is not nearly so sweet as saccharin.

When extensive toxicity studies had been completed, including feeding the material to three successive generations of mice, feeding it to rats daily for 2½ years, and giving it to dogs for a period of a year, it was concluded that the sweetening agent possessed a remarkably low toxicity. Rather broad clinical tests were then made, aimed at showing whether the material had any unexpected and rare poisonous properties in human beings which could not be foreseen.

After the agent had been cleared both in animal and human tests, we felt that we were justified in using the material in a small way to sweeten some unpalatable pharmaceutical preparations. This introduction of the material was a cautious one, because the preparations in which they were used were administered only in limited doses for a short period of treatment. Following this, we felt we were at last ready to put out the sweetening agent in tablet form for use by patients in their special diets.

The next step is one which crosses the borderline from drugs to foods. This is the biggest step. As you can imagine, a sweetening agent of this type might well be useful in the preparation of certain special dietary foods. Not of ordinary foods such as would be sold in a grocery store, of course, since artificial sweeteners are forbidden in such products by Federal law.

Before we could consider the introduction of the synthetic sweetener into special foods, we wanted to be entirely satisfied that the material is non-toxic. We are now satisfied, and the Food and Drug Administration has publicly stated its agreement, so that the material is considered safe for food use. Incidentally, the time elapsed since the first preliminary investigations were made on the material amounts to nearly 15

years, with some time out, of course, for more important war work.

Perhaps we should turn to another phase of our industrial activity. And in this phase it is the food industry which has taken the lead. I refer to the preservation and stabilization of perishable commodities. The canners have been pioneers in the study of this problem, and probably still know more about it than the drug manufacturers have ever learned. Other food technologists have looked into preservation by means of drying and freezing. In some cases it has been necessary to promote the stability of processed foods by addition of various types of preservatives. All of these techniques which have been developed by food scientists have been adapted by pharmaceutical manufacturers to their own problems and products.

Packaging problems are always with us. The tin plated can has a long and honorable history in the food industry. But more recently special food packaging problems have given rise to many new developments in glass containers, plastic films and coated papers. Drug manufacturers, on the other hand, have so far restricted their packaging largely to glass containers. We are cautiously looking into plastics, and have made a few tentative moves to use them.

Both industries are interested in the best process of killing pathogenic anerobic spore-forming microorganisms in our liquid products. It is at this point that drug people stand in awe of the food processors, who have accumulated data in such detail on the exact temperature and pressure which will safely process practically any food in any type of container of any given size. Along with these figures, you food technologists have picked up an immense amount of know-how on the design and control of processing equipment.

This is a field in which we have borrowed heavily in recent years, particularly since we began to put up in glass containers a variety of solutions to be used by intravenous infusion. Many of the drugs put up in this form are sensitive to excessive heat, to impurities in glass, to certain ranges of pH, and so on. We have adapted much of the food work on the heat killing of *Clostridium botulinum* and *Clostridium sporogenes* to the sterilization of these intravenous infusion solutions.

I would be very much surprised if the food industry were not highly interested in the recent reports on experimental preservation of canned foods with antibiotics which has been carried out at the Western Regional Research Laboratory. Addition of only 10 parts per million of subtilin appeared to be satisfactory for preservation even of non-acid foods used in the trials, thus permitting a quick heat processing step only sufficient to inactivate enzymes.

This promising line of research indicates that we may soon find another close tie between the food and drug industries. I can assure you that the pharmaceutical manufacturer will not mind if you find that you can properly make use of the production of the plants manufacturing antibiotics.

Since the beginning of time, food handlers have been faced with the problem of rancidity of oils and fats. Fortunately, many natural products of this class contain their own antioxidants, which permit their storage for a reasonable time. Technological advances have permitted the preparation of modified products such as hydrogenated oils, which themselves are then less susceptible to oxidation. However, there has been a continuing need for more effective antioxidants. Among agents of natural origin, oat flour has now been used broadly for a number of years. And more recently prolonged toxicity studies by the Food and Drug Administration and others have made it possible for the Bureau of Animal Industry to issue regulations permitting the use of a number of synthetic antioxidants, such as butylated hydroxyanisole, propyl gallate and esters of thiodipropionic acid.

Drug manufacturers have been aware to some extent that there is a similar stability problem with the fat-soluble vitamins A and D. However, I hardly think their consideration of the matter has generally gone as far as you have gone in stabilizing food fats and oils.

While we are speaking of the stabilization of foods and drugs, we might return for a minute to the surface-active agents. Druggists 15 years ago had few emulsifying agents which would permit them to put oily materials into a water base. Among them were lanolin, various gums and soap. With their help the druggist was able to make an ointment or a cod liver oil emulsion that was not objected to because it was the best there was.

In the last 12 years or so we have suddenly been deluged with a great variety of surface-active agents which permit an elegant job of emulsification that had not previously been thought of. We now have nicely flavored homogenous, aqueous dispersions of vitamins A and D which are almost entirely transparent. We also have stable suspensions of finely powdered procaine penicillin in water which are capable of producing prolonged penicillin blood levels with only a single injection.

In our daily lives we experience the benefits which food scientists have afforded us by the proper use of emulsifiers. No longer does the housewife expect to be spattered with hot fat from the frying pan, now that sulfated stearyl monoglycerides are incorporated into frying fats. Shortenings are easily creamed into cake batter, and in fact with surface-active agents there have been prepared the wide variety of cake, pie and biscuit ready-mixes to which the housewife needs only to add water.

Both of our industries experience enough change to keep things more than just interesting. As one would expect, there is competition between products from natural and synthetic sources, and sometimes the competition takes on the characteristics of a pendulum. It has certainly been true in the drug industry since the days of World War I. Before that time, of course, most drugs were of natural origin. But then along came the work of the great German chemist, Ehrlich, who developed a synthetic drug for syphilis. The impetus of this discovery was great and has never been lost.

During the 1920's and early 1930's, even though synthetic drug research was moving rapidly, scientific biologic research also progressed rapidly and brought

forth a large number of vaccines, antisera and bacterins which were invaluable in medical practice of the time. However, when the sulfa drugs were developed in the middle thirties, they were so specific and so effective against a number of serious microbial diseases that the pendulum swung far over to the synthetic side. For a few years we thought of almost nothing else—the future was bound to be in the field of highly active, highly specific synthetic organic drugs.

Then you know what happened. The pendulum suddenly took the most violent swing of all, and there we were with the best drug that had ever happened, a natural drug named penicillin. More of these antibiotics have come along since, and more will come in the future. But as it is, we now recognize that both nature and the chemical laboratory have a place in our scheme of things, and we look for good future drugs from both directions.

You in the food industry face similar, constantly changing situations. Most apparent to the outsider just now is the competition facing animal by-products. As a matter of fact, we in pharmaceutical manufacturing still feel very dependent on animal by-products. What drugs in the past year have received more publicity than cortisone and ACTH for rheumatoid arthritis? At present both drugs are derived from animal by-products.

We are all aware that synthetic materials have entered into the fields formerly monopolized by animal hides. Lard and hydrogenated lard are threatened, it is said, by synthetic emulsifiers in bakery products. We are very familiar, too, with the long-standing competition between butter and oleomargarine as they face each other in a common market.

There are conflicting impulses in our hearts regarding changes that take place in industry. There is the tendency to sympathize with the established manufacturer who has a good thing. We want to see him keep it. On the other hand, we sympathize with the newcomer who has developed a good thing. We want to see him make good with it. I think we can all agree that competition conducted on a fair basis is good for us all.

Although my acquaintance with food research is not great, I strongly suspect that the same principles guide its organization in your field that do in the drug industry. There is a certain amount of applied research directed toward the immediate improvement of products already on the market, or the improvement of manufacturing processes for them. There are those long months and years of carrying the food product from the laboratory to full-scale production. Then there is the devotion of a certain amount of effort to what the universities would call pure research—that is, research which is not directed toward any narrow end, but toward seeing what will turn up when intelligent investigators follow interesting leads.

In this last type of research, I might say that, to me, the principle of serendipity is most important. Serendipity, as you know, is the ability to find something valuable when you are looking for something else. Both the food and drug fields have provided many excellent examples. There is the "Brown 'n' Serve" baking formula that was discovered recently by a baker in Florida, an intelligent observation that may be revolutionizing the industry. There is the discovery of the potent antiepileptic action of Tridione, a drug which was first made and used as a pain-killer and which only months later was intelligently studied by a pharmacologist and seen to have utterly unsuspected possibilities in the treatment of epilepsy.

Have I belabored the subject enough? With a little thought we could easily collect much more evidence that the similarities of the food and drug industries are ample to justify our working together more often than we do now. Let's keep the way open for exchanging ideas. It will benefit us both in our efforts to promote the welfare of the American public.

The Preparation and Storage of Freestone Peach Juice and Nectar[a,b]

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(Received for publication, June 18, 1950)

The possibilities of using blends of peach juice with peach puree to produce nectars has been investigated. Some such nectars show consistency and flavor qualities superior to those of the clear peach juice.

The tremendous increase in production and sale of fruit juices in recent years has come about as a result of the demand for the high quality products. While it is likely that citrus, grape, pineapple, and tomato juices will continue to be the most important, it seems that there should be a demand for palatable fruit drinks prepared from some of the other fruits such as cherries, strawberries, raspberries, and peaches.

Several reports have been published on the preparation and pasteurization of such juices, and the changes which occur in them during storage *(1, 2)*. While juices from most of the other fruits were found to be acceptable, the juice or nectar from freestone peaches

[a] Journal paper No. 830, New York State Agricultural Experiment Station, Geneva, New York.

[b] Presented at the Tenth Annual Meeting of the I. F. T., Chicago, Illinois, May 24, 1950.

was not entirely satisfactory. Efforts to improve the latter product are described in this paper.

In some of the earlier studies, attempts were made to obtain satisfactory products from peaches by various methods, as hot and cold extractions, pressing and pulping, and the use of antioxidants. However, it was not until the following methods were developed, that an acceptable product was made. First, the color and flavor of peaches could be retained by blanching, cooling, and freezing, using ascorbic acid on the surface of the peaches. Second, it was found that a good yield of excellently flavored juice could be obtained by pressing fruit which had been frozen at 15° F. (—9.4° C.) and later thawed. A blend of the pressed juice so obtained with a pureed product resulted in a smooth textured, palatable nectar that retained the peach flavor characteristics.

A study has been made of this type of product to determine the proportions of pressed juice and pureed fruit necessary to give the most desirable texture and flavor. Further, since some juices have a limited storage life, it seemed desirable to store these products at different temperatures over a period of a year to note changes in color, flavor, ascorbic acid (vitamin C) and carotene (provitamin A) content.

Methods

In these studies, fruit harvested in 1945, 1946, 1948, and 1949 was used. The procedure found most suitable for preparing the peaches was to steam blanch fully ripened halved peaches for three minutes, followed by cooling, peeling, and packing in 30-pound enameled tins, adding a teaspoonful of ascorbic acid to the surface of the peaches. This is equivalent to approximately 40 mg. of ascorbic acid to 100 grams of fruit. The fruit was then frozen at 15 to 18° F. (—9.4 to —7.8° C.). After freezing, the cans were transferred to the 0° F. (—17.8° C.) room and held there until they were needed for processing. A part of these peaches were made into a clear juice by thawing and pressing in an ordinary hydraulic press, and the remainder into a pureed product by milling. For this latter purpose, a Fitzpatrick comminutor with No. 1 screen was used. It should be realized, however, that the results may differ with another type of mill or different size screen, particularly in regard to texture and proportion of pressed and milled juices.

Preliminary experiments in 1945 with Elberta peaches showed that a nectar of promise can be made by mixing clear juice with a peach puree. The yellow varieties Halehaven, Elberta, and Crawford, and the white variety Champion were used in 1946. Pressed juices only were studied. Elberta peaches were used in 1948 and 1949 for continued study of nectars because of their commercial production in quantity in this area, and since the flavor of this variety carries through to the final product. A peach variety which lacks flavor or has a very mild flavor could hardly be expected to yield the most desirable product. Five percent of sugar was added to juices. The quantity of sugar required may vary from year to year because of differences in acid and total sugars in the fruit used. It was found that the sugar could be added either at the time when the peaches were peeled for freezing or to the juice during processing.

The juice obtained from each variety was divided into two parts for storage tests. One-half of the juice was not pasteurized while the other half was heated to 170° F. (76.7° C.). The samples of both raw and pasteurized juices to be held in frozen storage were filled into pint bottles, nine-tenths full, to allow for expansion during freezing. These were stored at 15 to 18° F. (—9.4 to —7.8° C.) and at 0° F. (—17.8° C.). Pasteurized juices for storage at 34° F. (1.1° C.) and 70° F. (21.1° C.) were filled full in pint bottles, capped, cooled, and stored. Storage studies were carried out to determine changes in flavor, color, and ascorbic acid content at the different temperatures.

Yields as high as 72.6 percent juice were obtained by pressing the frozen and thawed fruit. This juice was blended with pureed fruit in varying proportions. The most satisfactory blend or nectar was one containing 25 percent puree and 75 percent juice. This product was milled again after blending and deaerated cold *(4)*. However, it was found necessary to deaerate it a second time in the cold, and a third time after heating to 160° F. (71.1° C.). This gave a smooth blend from which at least the greater share of the tissue gases had been removed. Sugar was added to the extent of 2.5 percent, and the nectar was then pasteurized at 180° F. (82.2° C.), filled into 12-ounce bottles, capped, and cooled. Bottles to be stored at freezing temperatures were, of course, filled only nine-tenths full. This nectar was stored at 0, 18, 34, 45, and 70° F. (—17.8, —7.84, +1.1, +7.2, and 21.2° C.). This product was very good but rather viscous.

In view of this viscosity, blends of juice and puree were prepared in 1949, containing 5, 10, 15, 20, 25, and 30 percent of puree. Preference tests with the original juice and the blends showed that the 15, 20, and 25 percent levels of puree were the most pleasing, the preference in texture leaning toward the lower and in flavor toward the higher amounts of puree. However, this is a matter of individual choice and it is obvious that a commercial processor would be obliged to determine the texture desired on the basis of consumer preference.

Analytical Methods

The juices were analyzed for ascorbic acid by the xylene extraction method of Robinson and Stotz *(5)* and for total carotene by using the foaming mixture method, followed by adsorption on a column *(3)*. Clear juices such as prepared in the 1946 series were not analyzed for carotene because it was obvious that only insignificant amounts of this substance could be present. Color density was determined with a Beckman Spectrophotometer at a wave length of 400 mμ, using 1 cm. cells.

Results

Taste tests (using a score of 1 for the poorest up to 10 for the best) indicated that Champion peaches give the best flavored clear juice (Table 1). Elberta gives a very satisfactory product under proper conditions of storage. Of the four varieties, Halehaven yielded a juice which was relatively inferior, probably because of its mild flavor. Juices stored at room temperature and those unpasteurized juices stored at 0° F. (—17.8° C.) were rated somewhat lower than the other juices. It seems odd that the unpasteurized juices stored at 0° F. (—17.8° C.) should rate lower than those stored at 18° F. (—7.8° C.).

TABLE 1

Average Flavor Panel Scores of Four Peach Juices After One Year's Storage

Peach variety	Pasteurized juice stored at				Raw juice stored at	
	70° F.	34° F.	18° F.	0° F.	18° F.	0° F.
Elberta	5.2	7.0	5.6	6.4	5.8	5.0
Champion	6.4	6.8	7.0	6.7	6.8	6.2
Crawford	6.1	6.3	6.7	6.0	6.3	5.4
Halehaven	4.8	5.1	6.8	....	6.0	2.4

While the flavor scores show that the clear juice is acceptable as a product provided it has been properly prepared and stored, it was obvious that some improvement would be desirable. Nectars prepared in the 1948 series which were blends of juice and puree were clearly superior.

Samples of the nectar when stored for a year at all storage temperatures used showed only slight losses of ascorbic acid and carotene (Table 2) and they were

TABLE 2

Ascorbic Acid and Carotene Content of Elberta Peach Nectar After One Year's Storage at Different Temperatures

Vitamin	Original juice	Pasteurized juice stored at				
		70° F.	45° F.	34° F.	18° F.	0° F.
Ascorbic Acid, mg. per 100 ml.	21	16	18	15	19	20
Carotene, mg. per 100 ml.	27	31	31	28	31	32

rated higher by the taste panel than the original juice samples. Average taste panel score for the product stored at 70° F. (21.1° C.); 45° F. (7.2° C.); 34° F. (1.1° C.); 18° F. (—7.8° C.) and 0° F. (—17.8° C.) were 5.1, 7.3, 7.8, 6.8, and 6.4 respectively. The nectars stored at the highest temperature were significantly poorer in flavor.

No significant changes in ascorbic acid content of peach juice occurred during storage (Table 3), except

TABLE 3

Ascorbic Acid Content of Ascorbic Acid—Fortified Raw and Pasteurized Peach Juice Stored at Different Temperatures

Peach variety	Ascorbic Acid Content, mg. per 100 ml.							
	Immediately after processing	Month's storage	Pasteurized juice stored at				Raw juice stored at	
			70° F.	34° F.	18° F.	0° F.	18° F.	0° F
Elberta	47	6	46	48	46	47	45	46
		12	43	53	51	52	50	50
Champion	31	6	27	29	31	30	32	28
		12	28	32	32	33	35	32
Crawford	23	6	19	20	21	21	20	20
		12	16	20	20	23	17	21
Halehaven	29	12	21	25	26	29	25	27

in those samples stored at room temperature. In these lots only the juices made from Halehaven and Crawford showed drops which might be considered greater than the experimental error.

In the 1946 peach juice, significant increases in optical density occurred during storage at room temperature (Table 4). At other storage temperatures,

TABLE 4

Changes in Optical Density at 400 mμ of Peach Juice During Storage

Peach variety	Month's storage	Optical density					
		Pasteurized juice stored at				Raw juice stored at	
		70° F.	34° F.	18° F.	0° F.	18° F.	0° F.
Elberta	0	0.41	.....	.....	.....	.....	.....
	6	0.43	0.39	0.38	0.38	0.38	0.39
	12	0.45	0.43	0.43	0.41	0.40	0.40
Champion	0	0.30	.....	.....	.....	.....	.....
	6	0.37	0.32	0.30	0.32	0.26	0.27
	12	0.44	0.34	0.35	0.38	0.32	0.32
Crawford	0	0.28	.....	.....	.....	.....	.....
	6	0.40	0.31	0.31	0.31	0.25	0.24
	12	0.47	0.51	0.35	0.31	0.33	0.30
Halehaven	0	0.25	.....	.....	.....	.....	.....
	6	0.32	0.26	0.26	0.26	0.24	0.24
	12	0.40	0.30	0.32	0.30	0.30	0.26

however, these changes were less, and may have been due almost entirely to the physical changes which occur during storage rather than to a true color difference as was obvious in the samples stored at room temperature.

Summary

The consistency, flavor, and ascorbic acid characteristics of the juices from four peach varieties were analyzed during storage at different temperatures. The clear juice from the Champion peach rated highest in flavor of the varieties tried.

A blend or nectar of peach juice and puree containing 15 to 25 percent of the latter, prepared from frozen Elberta peaches, was found to be a desirable product. The ascorbic acid and carotene contents of peach nectar were found to show little change on storage in the frozen state for one year.

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Control of Enzymatic Flocculation of Cloud in Citrus Juices

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The nature of the "cloud" in citrus juices is discussed in detail. Apparently there are several enzymes involved in the loss of "cloud" in unheated citrus juices. These enzymes must be inactivated in order to enhance the stability of citrus juices and of concentrates. The application of a previously described test to ascertain the expected stability of "cloud" in a citrus juice is discussed in view of recent processing developments in the citrus products industry.

Prior to about 1927, the carbonated beverage industry in the United States utilized practically no citrus juice as such in the production of orange and lemon sodas. These bottled carbonated drinks were by tradition brilliantly clear liquids composed essentially of carbonated water, sugar, citric acid, flavor and appropriate certified color. One large distributor of carbonated beverage did incorporate orange juice in his product for several years prior to 1927 but inasmuch as this component was clarified it did not contribute materially either to the appearance or the flavor of the beverage.

Laboratory work and trial sales campaigns at that time indicated that the carbonated beverage industry in many parts of the country would not accept products made from natural, or cloudy citrus juices. This resistance was due largely to the fact that the natural cloud forming constituents of the beverage would settle, leaving a clear or nearly clear supernatant liquid, and forming a layer of sediment in the bottom of the bottle. This was particularly objectionable to consumers who generally considered the presence of insoluble matter in clear beverages as an indication of spoilage or contamination. Bottlers also complained of the insoluble solids clogging various parts of the bottling equipment, and of the unsightly appearance of the beverages in display racks.

The first attempt to overcome these difficulties involved the use of gravity separation to remove the coarser insoluble solids. The juice was partially concentrated and then stored in tall cylindical tanks to allow the coarser particles to settle. The supernatant liquid, containing only the finely divided suspended materials, was used to prepare the final concentrate. This procedure was only partially successful in that flocculation of the finely divided insoluble solids frequently occurred before the concentrated juice was used by the bottler.

At about this time work was started on the development of a cloud stabilization process *(13)* based on the now well known scheme of pectic enzyme inactivation by high temperature pasteurization.

This process has become widely used not only in the manufacture of concentrated juices for preparation of beverage bases but also in the canning industry. Descriptions of some phases of flash pasteurization, as applied to the citrus industry, have appeared in the literature *(1-8, 10-12, 15)* but except for brief patent disclosures *(13, 14)* none of the work of this laboratory has been published.

Some of this earlier work is reviewed herein, particularly if the work has application in the present stages of citrus products manufacture.

Citrus juices extracted by the commonly used methods contain considerable quantities of insoluble solids, usually referred to as suspended matter. The amount of the material varies according to the method of extraction, screening, filtering, or centrifuging employed in the preparation of the juice. The insoluble matter varies in size from the very small pigmented bodies to the coarser bodies such as juice sacs, or fragments of juice sacs, section coverings, albedo, and the like. The relative proportions of the different size particles depend upon the method of extraction and screening.

When well deaerated fresh juice stands for a few hours, a sharp line of demarkation is generally obtained between the coarse and the more finely divided insoluble particles. The coarse material or pulp settles out and forms a loose layer in the bottom of the container. In the absence of enzyme action, settling of the finer particles is slower, and months may be required for substantial clearing of the juice. This material, which remains in more or less permanent suspension, is referred to as the cloud of the juice. Since most of the cloud is composed of pigmented material, it is also responsible in a large part for the characteristic color and general appearance of the juice. The cloud also carries much of the flavor of the juice and is therefore very important from this standpoint.

The insoluble matter in fresh juice is uniformly dispersed and may remain in this condition until destabilization is brought about by pectic enzyme action. The settling of the coarse insoluble solids may progress to completion, leaving a good cloud in the supernatant liquid, before enzymic flocculation of the cloud starts. When flocculation begins, the whole mass of cloud may appear to coagulate or precipitate simultaneously and settle out leaving the supernatant liquid clear or nearly so. In other cases a veil seems to form at the top of the liquid and slowly falls, carrying the cloud with it. In juices containing much pulp, the whole suspended pulp mass may form into a solid jelly, with separation of clear liquid at the top and sides of the container. With less pulp content the pulp may settle to the bottom before forming into a jellied mass. Some juices do not show enzymic flocculation even after long periods of storage at ordinary temperatures.

The theory of the enzymic flocculation of cloud is that the dispersed pectin, which in its natural state serves to stabilize the finely divided insoluble matter, is reduced in molecular size and partially demethoxylated by pectic enzyme action so that it becomes sensitive to the natural calcium and other salts of the juice. When sufficient pectin (and calcium) is present the pectin is converted to a solid gel. When small amounts of pectin are present the end products appear as a precipitate rather than as a gel. The finely divided insoluble solids are occluded in the gel or precipitate and carried down with it. The pectin in the coarser insoluble matter is affected in the same way but the action here probably serves more to increase the firmness of the particles than to occlude the cloud.

The earliest observations of the behavior of cloud in citrus juices prepared and handled in different ways were most perplexing. As may be seen in Table 1, raw juices extracted by different methods, with varying opportunity for contact with peel constituents, and with

TABLE 1

The Effect of Storage Temperature on the Time Required for Flocculation of Samples of Raw Orange and Lemon Juices (Samples Preserved with 0.25 Percent Sodium Benzoate)

Sample Number	Citric Acid (Anhydrous), percent	pH	Time Required for Flocculation at Different Temperatures, Days						
			2° C.	10° C.	20° C.	28° C.	37° C.	50° C.	60° C.
Orange 1	1.10	3.79	5.4	.....	3.4	1.5	2.0 [a]	12.0 [a]	7.3 [a]
Orange 2	1.09	3.80	2.0	.....	0.8	0.8	1.8 [a]	5.2 [a]	5.7
Orange 3	1.10	3.79	5.1	4.5	4.5	12.0 [a]	9.5	34.0 [a]	10.0 [a]
Orange 4	1.00	3.84	6.3 [a]	13.0 [a]	71.0 [a]	179.0 [a]	51.0 [a]	107.0 [a]	20.0 [a]
Orange 5	0.95	3.85	20.0 [a]	52.0 [a]	61.0 [a]	151.0 [a]	20.0 [a]	17.0 [a]	59.0 [a]
Orange 6	1.13	3.78	3.3	2.8 [a]	26.0 [a]	33.0 [a]	24.0 [a]	60.0 [a]	53.0
Orange 7	1.10	3.79	5.9	4.0 [a]	1.8	1.9 [a]	2.2 [a]	9.3 [a]	12.0 [a]
Orange 8	1.27	3.65	84.0 [a]	58.0 [a]	115.0 [a]	125.0 [a]	58.0 [a]	105.0 [a]	35.0 [a]
Orange 9	0.83	3.88	6.0	4.9	3.5	4.4 [a]	4.8	72.0 [a]	10.0 [a]
Orange 10	0.92	3.93	4.2 [a]	2.8	2.1	1.8	1.9	4.8 [a]	5.1 [a]
Orange 11	0.81	3.93	4.5	4.2 [a]	5.2 [a]	10.0 [a]	7.8 [a]	11.0 [a]	5.2 [a]
Orange 12	1.01	3.84	9.5	5.5	3.2	2.2 [a]	1.9	4.3 [a]	10.0 [a]
Orange 13	0.99	3.88	7.9	4.9	3.0 [a]	1.9	1.2	2.3	6.3 [a]
Orange 14	1.13	3.78	3.3	2.8	26.0	33.0	24.0	60.0	53.0
Lemon 1	6.11	2.43	29.0 [a]	.....	3.2 [a]	2.0 [a]	2.1 [a]	60.0 [a]	29.0 [a]
Lemon 2	5.45	2.40	10.0 [a]	96.0 [a]	17.0 [a]	12.0 [a]	4.1 [a]	53.0 [a]	14.0 [a]
Lemon 3	5.51	2.39	9.5 [a]	62.0 [a]	17.0 [a]	11.0 [a]	3.5 [a]	52.0	14.0 [a]

[a] These samples retained from a slight to considerable haze even after the flocculation process appeared to be completed. All others were brilliantly clear.

different final pulp contents were very erratic with respect to the tendency for cloud flocculation. Some samples flocculated within a few days and showed a consistent relationship between flocculation time and storage temperature, while others required up to 179 days for complete flocculation and showed no consistent relationship between flocculation time and storage temperature. The most rapid flocculation and the most consistent relation between flocculation time and storage temperature were obtained with juices containing relatively large amounts of pulp.

Reamer-extracted orange juice containing a relatively large amount of pulp, when acidified with citric acid or buffered with sodium citrate to different pH values and stored at different temperatures, showed a fairly consistent relationship between flocculation time and storage temperature. This is shown in Series I of Table 2. Juice prepared by crushing whole fruit between corrugated rolls (Series II), with pulp removal by first passing the juice through a reel type screen and then through a centrifuge, was very inconsistent in its behavior when treated and stored in the same way.

Further tests were made with these same two types of juices by first pasteurizing at different temperatures and then storing each sample at different temperatures, as shown in Table 3. The burred juice was again the most consistent in its reaction to storage temperature and to pasteurization temperature (Figure 1).

It will be observed that the flocculation rate of the burred juice, Series I, was decreased by pasteurization at temperatures as low as 122° F. (50° C.), particularly with 37.4° F. (3° C.) storage. The effect of the heat treatment progressively increased with increase in pasteurization temperature up to 158° F. (70° C.), with no further change at 176° F. (80° C.). The other type of juice, Series II and III, was less consistent in its reactions, for reasons that will be evident later, but even in this case a marked effect was evident from pasteurization at 158° F. (70° C.), with 37.4° F. (3° C.) storage.

This was the first evidence that orange juice contains either two pectin esterases, or possibly an esterase and an activator, and that one of the enzymes, or the activator, is inactivated by pasteurization at some temperature between 140 and 158° F. (60 and 70° C.) *(13)*. This was further indicated by adding pectin to a series of samples of juice pasteurized at different temperatures and determining the rate of demethoxylation at pH 6.5 by the method of Kertesz *(9)*.

The studies made to determine the conditions that influence the rate and completeness of flocculation of raw natural strength juice indicate that a number of

TABLE 2

The Effect of pH and Storage Temperature on the Rate of Flocculation of Orange Juice (Samples Preserved with 0.25 Percent Sodium Benzoate)

Series	Sample Number	Citric Acid (Anhydrous), percent	pH	Time Required for Flocculation at Different Temperatures, Days						
				2° C.	10° C.	20° C.	28° C.	37° C.	50° C.	60° C.
I	1	0.95	4.48	3.0	2.2	1.8 [a]	0.8	1.1	1.2 [a]	2.1 [a]
	2	0.96	4.17	4.4	2.6	1.5	0.9	0.8 [a]	0.9 [a]	1.5 [a]
	3	0.96	3.92	6.3	4.5	2.6	1.5	1.3	1.2	5.0
	4	1.47	3.58	3.9	2.5	1.5	1.1 [a]	1.1 [a]	2.6 [a]	10.0 [a]
	5	2.47	3.18	3.9	2.5	1.1 [a]	2.2 [a]	2.9 [a]	5.4 [a]	12.0 [a]
	6	3.46	2.95	2.8 [a]	2.8 [a]	3.9 [a]	8.9 [a]	6.9 [a]	12.0 [a]	24.0 [a]
	7	4.46	2.77	5.4 [a]	3.9 [a]	13.0 [a]	8.9	5.0 [a]	12.0 [a]	12.0 [a]
II	1	1.25	4.59	191 [a]	84 [a]	49 [a]	35 [a]	22 [a]	105 [a]	58
	2	1.27	4.19	85 [a]	48 [a]	39	25 [a]	12 [a]	106 [a]	43
	3	1.27	3.96	58 [a]	43	36	32 [a]	13 [a]	105 [a]	43
	4	1.27	3.65	84 [a]	58 [a]	115 [a]	125 [a]	58 [a]	105 [a]	35 [a]
	5	1.78	3.39	152 [a]	152 [a]	174 [a]	132 [a]	93 [a]	132 [a]	35
	6	2.52	3.09	>200	>200	>200	>200	200	93 [a]	58
	7	3.79	2.82	>200	>200	>200	>200	93 [a]	98 [a]	26 [a]
	8	5.73	2.49	>200	>200	>200	66 [a]	29 [a]	84 [a]	22 [a]

[a] These samples retained from a slight to considerable haze even after the flocculation process appeared to be completed. All others were brilliantly clear.

TABLE 3

The Effects of Pasteurization and Storage Temperature on the Rate of Flocculation of Orange Juice (Samples Preserved with 0.25 Percent Sodium Benzoate)

Series	Sample Number	Citric Acid (Anhydrous), percent	pH	Pasteurization Temperature °C. [b]	Time Required for Flocculation at Different Temperatures, Days						
					3° C.	10° C.	20° C.	28° C.	38° C.	52° C.	62° C.
I	1	0.99	3.88	none	7.9	4.9	3.0	1.9	1.2	2.3	6.3 [a]
	2	0.99	3.88	50.0	13.0	7.1	4.1 [a]	2.4	1.5	4.1 [a]	7.0 [a]
	3	0.99	3.88	60.0	30.0 [a]	17.0	8.3 [a]	4.6 [a]	2.7	3.5	7.0 [a]
	4	0.99	3.88	70.5	40.0 [a]	35.0 [a]	30.0	22.0 [a]	13.0 [a]	9.3	7.0
	5	0.99	3.88	80.0	40.0 [a]	35.0 [a]	30.0	22.0	13.0 [a]	9.3	7.0
II	1	1.13	3.78	none	3.3	2.8 [a]	26.0 [a]	33.0 [a]	24.0 [a]	60.0 [a]	53.0
	2	1.13	3.78	50.5	5.9 [a]	6.8 [a]	29.0 [a]	95.0 [a]	62.0 [a]	142.0 [a]	60.0
	3	1.13	3.78	60.4	10.0	7.2 [a]	4.9 [a]	27.0 [a]	130.0 [a]	42.0 [a]	66.0 [a]
	4	1.13	3.78	70.5	35.0 [a]	31.0	13.0 [a]	11.0 [a]	9.9 [a]	14.0 [a]	18.0 [a]
	5	1.13	3.78	80.0	36.0 [a]	31.0	13.0	10.0 [a]	6.3	19.0 [a]	26.0 [a]
III	1	1.10	3.79	none	5.9	4.0 [a]	1.8	1.9 [a]	2.2 [a]	9.3 [a]	12.0 [a]
	2	1.10	3.79	50.5	8.8 [a]	6.3 [a]	2.5	2.2 [a]	3.3 [a]	13.0 [a]	16.0 [a]
	3	1.10	3.79	60.4	18.0	12.0	5.1	3.3 [a]	2.9	9.2 [a]	11.0 [a]
	4	1.10	3.79	70.5	38.0 [a]	30.0 [a]	15.0	12.0 [a]	9.3	7.3 [a]	8.0 [a]
	5	1.10	3.79	80.0	38.0 [a]	30.0 [a]	15.0	7.3	6.9	7.3 [a]	8.0 [a]

[a] These samples retained from a slight to considerable haze even after the flocculation process appeared to be completed. All others were brilliantly clear.
[b] One minute holding time.

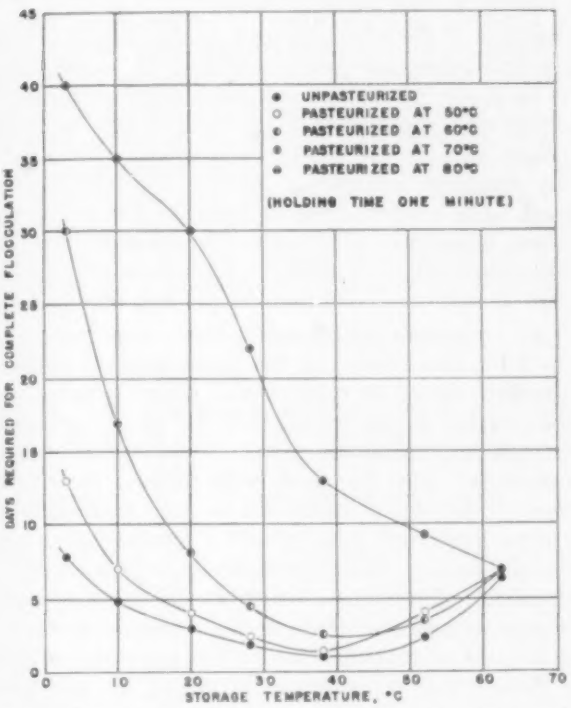

FIG. 1. The effect of storage temperature on the time required for complete flocculation of cloud in natural strength burred orange juice pasteurized at different temperatures.

factors are involved. The most important of these are the amount of pectic enzyme, soluble pectin, the calcium and related salts in the juice, the pH of the juice, and the storage temperature. The amounts of the first three substances are determined by the extent of maceration of the pulpy part of the orange in extracting the juice, the time of exposure of the juice to the pulp before screening, and the extent of removal of pulp in screening. The maturity and condition of the fruit are also of importance. The pectic enzymes seem to be associated with the pectin bearing insoluble solids and consequently the extent of maceration and the amount of pulp left in the juice may have a marked effect on the enzyme content. The calcium is also contained mainly in the pectin bearing part of the pulp. The soluble or dispersed pectin content of the juice is influenced by the pH of the juice and the opportunity given for acid and possibly enzymatic hydrolysis of the pulpy part of the fruit. The pH of the juice is important in another respect, in that it influences the rate of flocculation.

Because of great variation among different juices of the factors that influence the rate of flocculation, the effect of pH could not be exactly determined. Under reasonably favorable conditions the rate of flocculation does not vary greatly over the pH range of about 2.8 to 3.8. The rate decreases rather sharply with lower pH, particularly within the range for lemon juice. As the concentration of enzyme is decreased by pasteurization or other means, the process becomes more sensitive to pH as well as to the other factors. From the data obtained in developing an accelerated flocculation test, using juices in which a substantial amount of the enzymes had been inactivated by pasteurization, it appears that the optimum pH for the process lies between about 2.8 and 3.3, with storage temperature of about 113° F. (45° C.). The optimum pH shifts up or down as the temperature is raised or lowered from this value.

A complication in determining the relation between pH and rate of flocculation is that acid hydrolysis alone appears to be capable of causing changes in pectin which result in a flocculation similar, if not identical, to that caused by enzyme action. This chemical process is accelerated by low pH and high temperatures making it particularly operative in lemon juice.

When raw orange juice is concentrated by the conventional methods, a number of changes occur that affect the rate of flocculation. The concentrations of enzyme, pectin and salts are increased and the pH may be lowered to a somewhat more favorable range. These changes accelerate flocculation and greatly increase the tendency for gel formation at ordinary temperatures. If the concentration is carried high enough, some of the juice constituents increase in concentration sufficiently to have retarding effects. Excessive total soluble solids, titratable acidity, and sodium and potassium salts are definitely inhibitive in action. In case of concentrated lemon juice the increased acidity is the most important inhibitive factor.

Some raw juices flocculate completely when concentrated to 30-60° Brix with the conventional batch evaporators which may require as long as 12 hours for completion of a batch. By careful preparation of the juice to keep the enzyme, calcium, pectin, and pulp contents low, the tendency for flocculation is decreased. Pasteurization at 149-158° F. (65-70° C.), with 1 minute holding time, to inactivate part of the enzyme system also is of value in controlling flocculation.

The soluble solids of juice do not have any appreciable effect on the rate of flocculation until raised to about 45° Brix. The effect increases progressively with increased concentration above this point. With partially stabilized juices or juices relatively low in enzyme content, the effect becomes significant at 60 to 65° Brix. By lowering the pH of the juice to cause true pectin-sugar-acid gel (jelly) formation at 65° Brix, further retardation of flocculation can be obtained.

In using pasteurization to inactivate the pectin enzyme system in citrus juices, two methods may be employed. If the juice is to be frozen and kept in this condition, it is not necessary to completely inactivate the pectic enzymes and consequently a low temperature stabilization process may be used. If the juice is to remain stable under all storage conditions and for all uses, it is necessary to use the high temperature process.

It has been the general practice in the manufacture of frozen juice products to use raw or unpasteurized juice. The reason for this is that pasteurization is generally considered to impair the fresh flavor and nutritive value of the juice and with certain types of juice to materially lighten the color.

When frozen natural strength citrus juice is stored at temperatures as low as —10° F. (— 23.3° C.), complete flocculation may occur within a few days. The rate and completeness of flocculation can be influenced by proper juicing, screening, and handling methods, as discussed above, but it is not feasible to control flocculation entirely in this way. Proper screening is important in another way, in that high pulp content leads to the development in California orange juice of an off taste that has been described as "straw" taste. Peculiarly, frozen 42° Brix concentrated juice has been found to be less subject to flocculation than natural strength juice.

In earlier manufacture of frozen natural strength orange juice it was found that flocculation of the insoluble solids could be controlled satisfactorily by pasteurizing the juice at about 149° F. (65° C.), with about 1 minute holding time. This seems to be about the minimum requirement but in commercial practice slightly higher temperatures, as 149-158° F. (65-70° C.), were used because of lack of precision control of the pasteurization process. This process has been used successfully with 42° Brix concentrated juice in laboratory studies.

The pasteurization conditions necessary to effect low temperature stabilization coincide rather closely with the minimum conditions necessary to destroy spoilage organisms.

The amount of damage to the flavor of juice caused by pasteurization is determined to a considerable extent by the method of preparing, screening and handling of the juice. Entrapped air and, in general, increased pulp content contribute to flavor damage. The type and method of operation of the pasteurizer may also be important.

Raw frozen juice is practically always superior in initial flavor to pasteurized frozen juice. In comparative tests with natural strength juice containing considerable pulp, most tasters considered the pasteurized product as equal or preferable in flavor, after six to twelve months of storage. Because of destruction of enzymes or some other change, pasteurized juice deteriorates more slowly during storage than raw juice.

Whenever citrus juices are to be stored in the nonfrozen state substantially complete inactivation of the pectic enzyme system usually must be effected to be certain that enzymatic flocculation of cloud will not occur. This is particularly true of products that are to be used in bottled beverage bases.

Because of the wide variation in the factors of citrus juice that affect the extent and rate of flocculation, it was necessary to devise a reliable method of measuring the flocculation potential of juice before any reasonably accurate data on the conditions necessary for substantially complete inactivation of enzymes could be obtained. The method used in much of the work is described elsewhere *(14)*. Barium chloride and pure commercial pectin are added to the sample which is then stored at optimum conditions of pH and temperature.

The minimum temperature-time combination required for inactivation of the pectic enzyme system is dependent upon the pH of the juice. Orange juice which varies in pH from about 3.3 to 3.8 requires a relatively high minimum temperature. A relatively low temperature may be used with lemon juice which varies in pH from about 2.2 to 2.4. California and Arizona grapefruit juice which is intermediate in pH, about 2.7 to 3.2, is also intermediate in temperature requirement. Other factors such as the enzyme content, the amount and coarseness of the insoluble matter, and the amount of entrapped air in the juice also influence the pasteurization conditions necessary for satisfactory inactivation of the enzyme system.

There is a minimum temperature for each pH below which it is not feasible to go without extending the holding time to unreasonable limits. This temperature for orange juice of pH 3.8 is about 189° F. (87° C.). At this pH satisfactory stabilization of orange juice, deaerated and of average pulp content, may be accomplished at 192° F. (89° C.) with holding time of about 2 minutes. By raising the temperature to about 201° F. (94° C.) the holding time may be decreased to 15 seconds. At pH 3.3 the temperatures required with these two holding times are about 185 and 194° F. (85 and 90° C.), respectively. The corresponding temperatures for grapefruit juice of pH 3.2 and lemon juice of pH 2.4 are 183 and 192° F. (84 and 89° C.), and 156 and 165° F. (69 and 74° C.), respectively.

The curves in Figure 2 show what is considered to be the minimum pasteurization temperature required with one and two minute holding times to obtain satis-

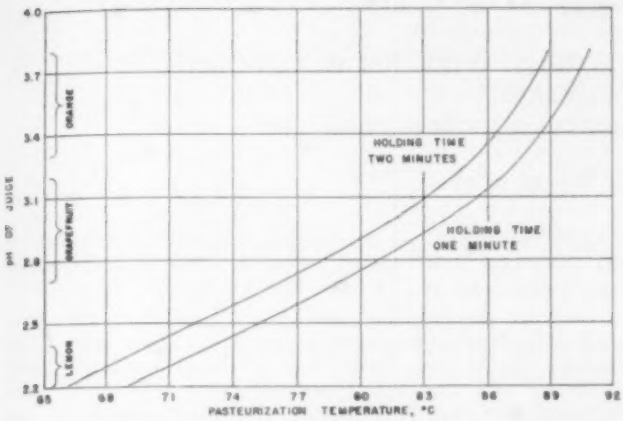

FIG. 2. Trend curves representing minimum temperature required to provide satisfactory inactivation of pectic enzymes in natural strength citrus juices of different pH.

factory stabilization of cloud over the pH range of 2.2 to 3.8. These curves are based on data obtained with a continuous laboratory pasteurizer with which the pasteurization conditions could be controlled accurately. The residual flocculation potential of the juice was determined with an accelerated test method, also by determining the behavior of the juice under the most favorable commercial conditions for flocculation of cloud. The results obtained with individual batches of orange juice at three different pH values are shown in Figure 3. The lower pH values were obtained by

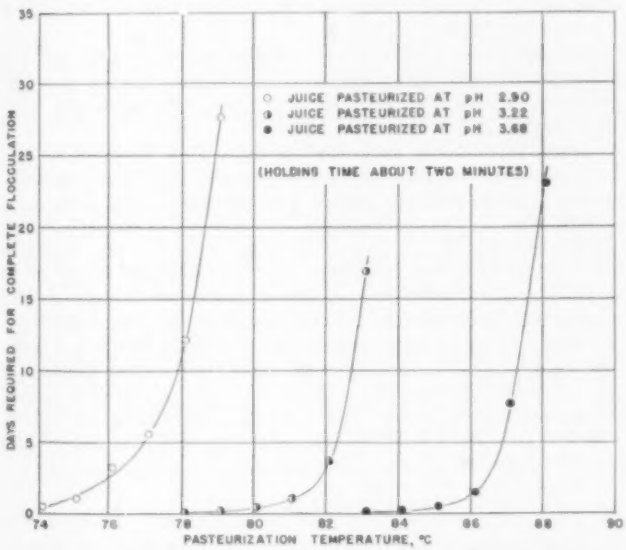
JUICE PASTEURIZED AT pH 2.90
JUICE PASTEURIZED AT pH 3.22
JUICE PASTEURIZED AT pH 3.68
(HOLDING TIME ABOUT TWO MINUTES)
DAYS REQUIRED FOR COMPLETE FLOCCULATION
PASTEURIZATION TEMPERATURE, °C

FIG. 3. The effect of pH on the pasteurization requirements to stabilize the cloud of burred orange juice. Flocculation time was determined by an accelerated test in which 20 days' stability indicates commercially satisfactory juice.

adding citric acid to the juice. The juices of these series requiring 20 days or longer for flocculation by the test method used were considered as satisfactorily stabilized. The effect of holding time in the pasteurization of lemon juice is shown in Figure 4. Samples of this series that required 4 days or longer for flocculation were considered as satisfactory in stability.

In commercial operation it is considered desirable to keep the holding time within the range of about 0.25 to

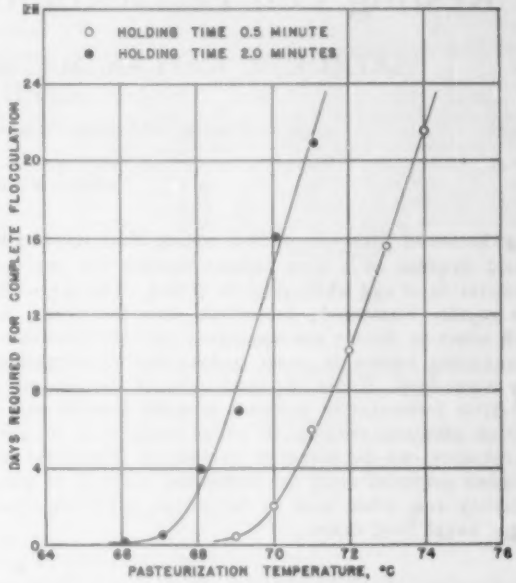
HOLDING TIME 0.5 MINUTE
HOLDING TIME 2.0 MINUTES
DAYS REQUIRED FOR COMPLETE FLOCCULATION
PASTEURIZATION TEMPERATURE, °C

FIG. 4. The effect of pasteurization temperature on the inactivation of pectic enzymes in burred lemon juice (pH 2.3). Flocculation time was determined by an accelerated test in which 4 days' stability indicates commercially satisfactory juice.

2 minutes and employ the lowest temperature that will insure satisfactory results with the particular operating conditions used. A rapid and reliable method of testing for residual active enzyme is essential for controlling such a commercial process.

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Resting Cell Fermentation of Egg White by Streptococci[a]

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The use of Streptococci in a resting state appears to hold promise as a pure culture method for the fermentation of egg white prior to drying. The egg white is rapidly fermented; proteolysis does not occur; no off odors or flavors are apparent; and the growth of organisms known to cause undesirable fermentations is suppressed. Under the conditions of the process, a flexible fermentation program is made possible and a dried albumen varying in range from acid to near neutrality can be prepared as desired. Pan-dried albumen prepared from the fermented white is of good quality and, when used in the recipe, produces excellent angel food cakes.

Production of edible-grade, dried egg albumen has been hampered by the variable results obtained when egg white is "spontaneously" fermented prior to drying. In an effort to obtain satisfactory fermentations, pure culture techniques have been proposed *(1, 2, 4, 5, 15)* but have not been generally adopted by the industry. Failure to suppress growth of undesirable microorganisms, poor quality of the fermented white, presence of odors or flavors foreign to egg white, and the nature of the microorganisms themselves from a sanitary point of view are some of the reasons given for the reluctance to use pure culture fermentations. Apparently the foregoing objections are surmounted and certain advantages gained when a resting cell fermentation, using *Streptococci*, is employed. The experimental work described below presents the details of the process *(7)* and its advantages as shown by laboratory-scale fermentations.

Procedures and Methods

Streptococci used in this study were *Streptococcus liquefaciens* 4533,[c] *Streptococcus lactis* L-21,[c] and *Streptococcus lactis* 7963.[d] The strains were routinely carried in aseptically harvested egg white, adjusted to pH 6.8, or in semi-solid trypticase soy agar. Master stock cultures were prepared according to the freeze-drying method of Raper and Alexander *(10)* with trypticase soy agar as the culture medium and sterile skim milk as the suspending medium.

Concentrates of *Streptococci* for seed were prepared from 18 to 24 hour tryptose-phosphate or, preferably, trypticase soy broth cultures by the filtration technique of Kaplan and Elberg *(6)* and later by centrifugation in a Sharples super centrifuge.[e] The former technique yielded pastes containing on the order of 1.3×10^{12} organisms per g.; the latter yielded concentrates on the order of 2.5×10^{11} organisms per g. Original broth counts were on the order of 2.3×10^{8} to 7.0×10^{8} per ml.

Bacterial counts, other than gram negative counts, were made after 48 hours incubation using trypticase soy agar. Gram negative counts were made after 24 hours incubation using violet red bile agar plus 1 percent sucrose. The pour plate technique was used for all counts. Incubation temperature was 30° C. (86° F.) for *Streptococcus lactis*, 37° C. (99° F.) for *Streptococcus liquefaciens*, and 37° C. (99° F.) for gram negative organisms.

Reducing sugars were determined by the colorometric method of Somogyi *(11, 12)* and Nelson *(9)* while nonprotein nitrogen was determined as described by Hawk, Oser, and Summerson *(3)*. Both determinations were made with a Klett-Summerson photoelectric colorimeter fitted with a No. 54 filter. Hydrogen-ion concentration determinations were made with a Beckman pH meter and glass electrode. Formol nitrogen was determined by electrometric titration *(8)* with the Fisher titrimeter.

Egg white for the fermentation studies was for the most part commercially frozen white purchased on the open market in 30-pound tins and held at —26° C. (—15° F.) until used. Freshly broken-out egg white was used in certain instances as indicated. The amount of egg white fermented varied from 100 ml. to 9,000 ml. Normal lactic acid was used to adjust the pH of the egg white prior to fermentation, and whipping tests were carried out according to standard procedure *(16)* with a Kitchen Aid Model G Mixer.

Fermented egg whites were pan-dried in a Proctor and Schwartz 10-tray pan drier at 120° F. (49° C.) to approximately 6 percent moisture. Moisture was determined by overnight drying at 100° C. (212° F.) *(16)*.

Angel food cakes were made with the following formula: Egg albumen (reconstituted to 87 percent moisture) 1¼ cups, cream of tartar 1¼ tsp., salt ¼ tsp., sugar 1½ cups, cake flour (sifted once before measuring) 1 cup, vanilla extract 1 tsp., almond extract ¼ tsp. Cream of tartar and salt were added to the egg white at room temperature and beaten for 10 to 20 seconds at the third speed of the Kitchen Aid mixer. Three-quarters of a cup of sugar was then added in 4 equal portions, and the beating continued until the meringue reached a soft-peak stage. The remaining sugar and flour, sifted together 2 times, were folded into the meringue in 4 equal portions, placed in an ungreased 10-inch tube cake pan, and baked at 375° F. (191° C.) for ½ hour. The cake was then cooled in an inverted position prior to removal from the pan.

Results

Preliminary investigations in this laboratory with a number of strains of *Streptococci* revealed that the rate of fermentation of egg white varied with the size of the inoculum added as a broth culture. The practical time reduction, however, was limited by the increasing broth contamination of the egg white with increased inoculum size. Through the use of bacterial concentrates it was possible to increase the inoculum to any desired concentration and to appreciably decrease the time of fermentation without contaminating the egg white with broth. Fermentation was thus attained within 2 hours under optimum conditions of temperature and inoculum size (Table 1). In addition, when taken up in an equal weight of saline and held at 4° C. (39° F.), concen-

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[a] Presented before the Tenth Annual Meeting of the I. F. T., Chicago, Illinois, May 23, 1950.

[b] One of the Divisions of the Bureau of Agricultural and Industrial Chemistry, Agricultural Research Administration, U. S. Department of Agriculture.

[c] Obtained from Dr. R. A. Tittsler, Bureau of Dairy Industry, U. S. D. A.

[d] Obtained from the American Type Culture Collection, Washington, D. C.

[e] Mention of this and other products and equipment does not imply Department of Agriculture endorsement or recommendation over other products of similar nature not mentioned.

TABLE 1

Fermentation of Egg White By Concentrated Streptococci [a]

Incubation time (hours)	Inoculum Size (percent)									
	0.10		0.25		0.50		0.75		1.00	
	pH	Glucose	pH	Glucose	pH	Glucose	pH	Glucose	pH	Glucose
		percent		*percent*		*percent*		*percent*		*percent*
0	9.10	.332	9.10	.364	9.00	.320	8.95	.331	8.75	.348
1	8.70	.272	8.40	.320	8.00	.256	7.50	.180	6.90	.144
2	8.50	.274	7.50	.219	6.85	.130	6.30	.032	6.15	.005
3	8.00	.269	6.95	.159	6.50	.056	6.20	.005	.....	.....
4	7.70	.224	6.90	.102	6.20	.029	.....	.....	.....	.....

[a] Incubation temperature: 37° C. (99° F.). Organism used: *Streptococcus lactis.*

trated *Streptococci* maintained their viability for at least 28 days (Table 2) with no loss of fermentative ability.[f]

The "natural" fermentation of egg white has been shown to be accompanied by an increase in bacterial population *(14)*. In this laboratory, studies with graded inocula of concentrated *Streptococci* demonstrated an increase in total and gram negative counts when small inocula were used and when the fermentation was correspondingly slow. The use of small inocula for the fermentation also appeared to stimulate the growth of

TABLE 2

Viability of Concentrated Streptococcus lactis When Stored At 4° C. (39° F.) [b]

Storage Period	Viable Count (per g. concentrate)
0	5.0×10^{11}
8	5.0×10^{11}
28	5.9×10^{11}

[b] Concentrate suspended in equal weight of saline.

gram negative organisms (Table 3) and was often accompanied by off flavors and odors. With optimum inocula and rapid fermentation, however, no increase in total bacterial count and no development of off flavors and odors were observed. Optimum inocula of concentrated *Streptococci* inoculated into sterile egg white *(15)* showed no increase in numbers during the course of the fermentation (Table 4). When inoculated into egg white contaminated simultaneously with 0.5 ml. each of a 24-hour broth culture of *Aerobacter cloacae, Proteus vulgaris, Serratia marcescens,* and *Pseudomonas sp.* or into egg white contaminated with a suspension of chicken feces, no increase in either total or gram negative count was observed nor any off odors or flavors noted (Table 5).

[f] Rapid fermentations have been obtained with a suspension stored for 80 days. The initial count of this suspension was not available but the count at 80 days was 6.5×10^{11} organisms per g. This count is within the range obtained with fresh concentrates (Table 2).

TABLE 4

The Fermentation of Egg White by Streptococci in a Resting State [l]

Time (hours)	Bacterial Count (per ml.)	pH	Glucose, percent	N.P.N., mg.-percent	Formol Nitrogen, mg.-percent
0	5.0×10^{9}	8.60	.320	14.50	80.22
1	5.0×10^{9}	6.30	.066		
1.5	5.0×10^{9}	6.20	.006	18.50	79.32

[l] Incubation temperature: 37° C. (99° F.). Inoculum: 1 percent by weight. Organism used: *Streptococcus lactis.*

TABLE 5

The Fermentation of Contaminated Egg White by Concentrated Streptococci [k]

Incubation time (hours)	Total Bacterial Count (per ml.)	Gram Negative Count (per ml.)	Glucose, percent	pH
0 [l]	<100	<100	.424	6.80
0 [m]	4.7×10^{9}	9.2×10^{6}	.310	7.10
1	4.7×10^{9}	3.9×10^{6}	.027	5.38
4	4.0×10^{9}	5.5×10^{6}	.022	5.39
5	1.4×10^{9}	5.3×10^{6}	.026	5.38

[k] Incubation temperature: 37° C. (99° F.). Inoculum size: 1 percent by weight.

[l] Bacterial count prior to addition of microorganisms.

[m] Bacterial count after addition of *Streptococcus liquefaciens,* and gram negative contaminants.

The fermentation of egg white by optimum inocula of concentrated *Streptococci* appears, therefore, to be brought about by *Streptococci* in a resting state and results in the suppression of the gram negative contaminants stated to cause undesirable fermentations.

Optimum fermentation of egg white by *Streptococci* was found to occur over the temperature range of 26° C. (79° F.) to 37° C. (99° F.), while final pH of the product varied from pH 5.6 to 6.5 depending on the initial pH adjustment (Table 6). It is thus possible to ferment egg white at its natural pH with no acidification, if desired. No significant proteolysis, as evidenced by nonprotein nitrogen and formol nitrogen determinations, occurred during the course of fermentation (Table 4), and the fermented egg white showed no browning when held at 120° C. (248° F.) for 2 hours *(13)*.

TABLE 3

Bacterial Population Changes In Egg White Seeded With Small Inocula of Concentrated Streptococci [l]

Inoculum (percent by weight)	Total Viable Count (per ml.)			Gram Negative Count (per ml.)			Glucose (percent)		
	0 hrs.	4 hrs.	24 hrs.	0 hrs.	4 hrs.	24 hrs.	0 hrs.	4 hrs.	24 hrs.
Uninoculated	2.0×10^{3}	1.6×10^{4}	5.5×10^{4}	25	45	1.9×10^{4}	.362	.360	.360
.05	4.0×10^{5}	1.2×10^{7}	9.0×10^{7}	10	30	5.2×10^{7}	.366	.344	.054
.15	1.5×10^{6}	1.2×10^{7}	5.9×10^{7}	40	60	2.2×10^{6}	.370	.298	.005
.30	2.8×10^{6}	6.0×10^{6}	1.2×10^{8}	10	120	6.5×10^{5}	.370	.290	.005
.50	8.0×10^{6}	1.0×10^{8}	3.5×10^{7}	25	20	1.6×10^{6}	.358	.206	.005

[l] Incubation temperature: 37° C. (99° F.). Egg white adjusted to pH 6.8 prior to fermentation. Organism used: *Streptococcus liquefaciens.*

TABLE 6

Effect of Temperature and Initial pH on the Fermentation of Egg White by Streptococci in a Resting State [a]

Incubation Temperature	Time (Hours)	Sample 1		Sample 2		Sample 3	
		pH	Glucose, percent	pH	Glucose, percent	pH	Glucose, percent
26°-28° C.	0	7.00	.339	7.50	.381	9.00	.311
	1	6.40	.221	7.00	.208	8.05	.231
	2	6.00	.109	6.40	.104	7.50	.090
	3	5.60	.023	5.95	.005	6.60	.036
	4	.....	.....	.....	.....	6.50	.008
37° C.	0	7.00	.311	7.50	.381	9.00	.355
	1	6.30	.147	6.30	.133	7.15	.163
	2	5.60	.005	6.00	.005	6.60	.005
	3	5.60	.005	6.00	.005	6.45	.005

[a] Inoculum: 1 percent by weight. Organism used: *Streptococcus lactis.*

The fermented dried white war readily reconstituted and gave a clean breaking, even textured 6½-inch whip when beaten under standard conditions. When used in angel food recipes, cakes excellent in all respects were obtained as judged by an independent taste panel for appearance, aroma, texture and consistency, flavor, and acceptability (Figure 1).

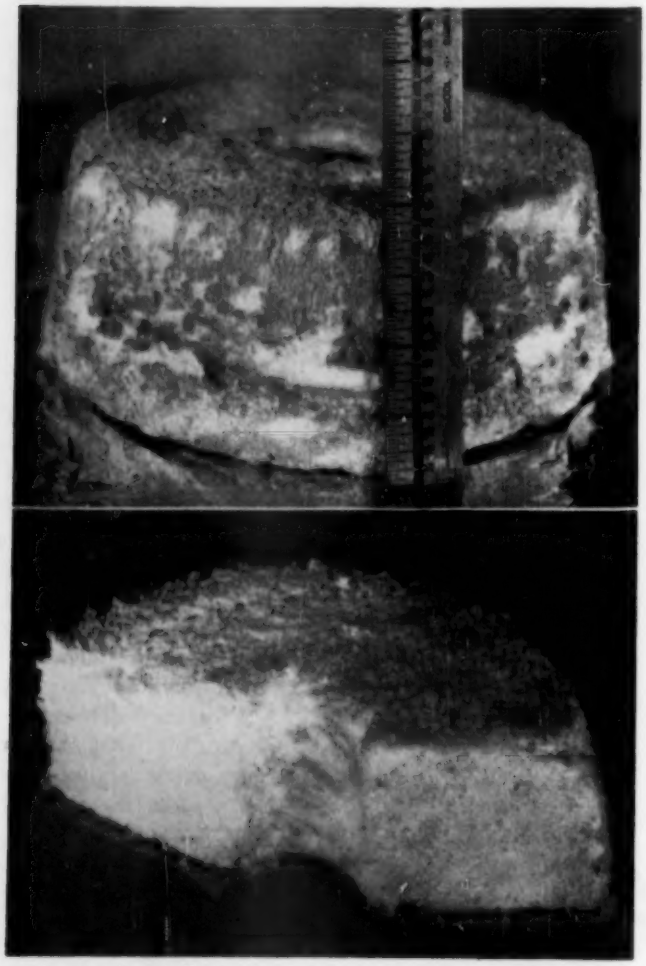

FIG. 1. Angel food cake baked with pan-dried albumen fermented by concentrated *Streptococci* prior to drying.

Discussion and Summary

The use of *Streptococci* in a resting state appears to hold promise as a pure culture method for the fermentation of egg white prior to drying. *Streptococcus lactis*, the organism of choice, is considered nontoxic and noninfectious, is not a gas producer, does not cause proteolysis of egg white, and, under the conditions of the process, produces a rapid fermentation free of objectionable odor or flavor. The temperature range over which the process can be carried out, 26° C. (79° F.) to 37° C. (99° F.), is wide, while albumen varying in pH from 5.6 to 6.5 can be produced at will. The necessity, inconvenience, and cost of attempting to neutralize acid egg white is thereby obviated if a near-neutral white is desired, since fermentation of egg white at its natural pH results in a final pH of 6.5. The dried albumen prepared from egg white fermented in this manner has the same pH after reconstitution as it had prior to drying.

The use of bacterial concentrates for the fermentation eliminates contamination of egg white by broth constituents and does away with the preparation of mother cultures of egg white with all the attending microbiological hazards of contamination associated with such preparations. Since concentrates can be held for a relatively long period without loss of viability, prepared seed can be held in stock until such time as it is convenient for the fermentation to be initiated. A flexible fermentation program is thereby made possible.

The use of microorganisms in a resting state, as described, results in an extremely rapid fermentation with suppression of the microorganisms shown to be responsible for "off" fermentations.

Application of the process to industrial usage awaits the results of evaluation studies now being conducted under commercial conditions.

Acknowledgment

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Bacterial Fish Spoilage and Its Control[a]

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A REVIEW

It is generally accepted that the changes occurring in fish flesh, which lower its palatability and consequently its consumer acceptance, are caused primarily by bacterial action. It is also accepted that the flesh of healthy, live fish is sterile, but that soon after death bacteria begin to invade the muscle tissues from the surface slime and intestinal contents where they occur in large numbers. Recent studies on the effects of temperatures near the freezing point upon fish spoilage bacteria and their activity have emphasized their psychrophilic nature.

The main avenues of controlling the bacteria responsible for fish spoilage, namely the reduction of the initial contamination and the inhibition of bacterial growth and activity, are under investigation in various countries. The first is achieved by means of improved sanitary methods of handling fish aboard vessels and in fresh fish plants. In the achievement of the second, the most important single factor, low storage temperature, is emphasized through improved construction of vessels' holds and more effective methods of stowage and shipping.

Introduction

The term spoilage is a relative one. The changes which befall the fish flesh between the death of the fish and the time it is completely spoiled may be gradual and assessable, but the point in this chain of successively changing conditions at which the fish flesh is considered no longer palatable, may vary widely with individuals. Opinion may be influenced by the individuals' geographical location, race, customs and eating habits. In Scandinavian countries, for example, some housewives buy only live fish at the local fish market, to assure perfect sea-freshness. Elsewhere, particularly in inland regions, many people have become used to and accept certain changes in the flavor of sea fish which can no longer be associated with perfect sea-freshness. It is also well known that many far-eastern people, in order to make their monotonous, tasteless rice diet more palatable, will flavor it with fermented fish sauces which to our palate are quite foreign if not unacceptable. But even in our own part of the world some fishery products, such as marinated fish and anchovies fillets, are often preferred after they have undergone a certain amount of ripening. We must remember, however, that such products, on account of their rich flavor, are usually not eaten as staple foods, but rather as a seasoning or an appetizer.

Without further elaborating this aspect of varied flavor preferences, let us concentrate on the initial changes from freshness to early spoilage and their effects upon the palatability of what is commonly known as fresh or wet marine fish.

Sea-Freshness

For meat and game a certain amount of aging is desirable, but for fish, such as cod and haddock, taste panel tests have shown that the freshest fillets, i.e. those cut from fish still in rigor, have the highest palatability rating *(5)*. Cod fillets stored at 32° F. (0° C.) for only one day were found to have already lost some of their most desirable sea-fresh flavor. Of interest is that these changes were noticeable in tasting and smelling the cooked fish flesh before any difference could be demonstrated chemically or organoleptically in the raw fillets. It would be a great exaggeration to conclude from this that fish which have been stored in ice for a number of days are no longer palatable. Yet, the rapid loss of the sea-fresh flavor is a plausible explanation of the fact that fish consumption by populations living near the sea shores, where sea-fresh and nearly sea-fresh fish may be obtained, is often two to four times as high as it is far inland where many people may be entirely ignorant of the real sea-fresh qualities of marine fish.

Initial Changes: Rigor

Why does sea-freshness disappear so soon? We know that tissues, immediately upon death, are attacked by the autolytic enzymes of both the muscles and the intestinal glands, and later those of the bacteria which may invade the tissues.

[a] Presented before the Tenth Annual Meeting of the I. F. T., Chicago, Illinois, May 23, 1950.

It is generally agreed that autolytic processes account for the initial changes, externally noticeable as rigor mortis, involving transformation of the muscle glycogen to lactic acid with a lowering of the pH to about 6.6 to 6.2. The onset and duration of rigor have been found to vary with different species: Onset at 35.5 to 37.5° F. (2 to 3° C.) in mackerel occurring in a few minutes, in flatfish in 10 hours to mention the two extremes *(15)*. They also depend to a large extent upon the amount of struggling of the fish immediately before death. Trawler caught fish and fish struggling before death go into rigor more quickly and the rigor is of shorter duration than for handlined fish. Low storage temperature during rigor and a low pH will also prolong its duration. A low pH as 5.5 is usually found in flatfish, e.g. halibut *(8)*, and may explain why flatfish keep better, and why they are sometimes preferred when 2 to 3 days old.

Bacterial spoilage of the tissues does not set in until the rigor has been resolved. In order to delay bacterial spoilage of fish flesh, it is therefore of advantage to delay the onset as well as the resolution of rigor.

Bacteriological Activity

It is also agreed that the changes brought about by autolytic agents, in the non-fatty fishes at least, are rather negligible as compared with the changes caused by bacterial action, in spite of the fact that the flesh of healthy live fish is sterile. Pieces of aseptically cut cod fillets from fresh fish have been held under almost aseptic conditions at 41° F. (5° C.) for 4 to 5 weeks before the first signs of spoilage were noticed *(1)*. On the other hand, pieces of fish flesh cut from gutted cod, held in crushed ice up to 16 days, were found to be completely spoiled although still sterile. Spoilage in this case was due to the diffusion of fish spoilage products from the surface, where the bacterial action took place, into the flesh *(6)*.

The sources of bacterial contamination of the fish flesh are the intestinal contents, the slime covering the fish and dirty surfaces with which fish come into contact on the deck and in the holds of fishing vessels and in the fish plants. A thorough review of the qualitative and quantitative bacteriological aspects of marine fish and fish spoilage has been published recently by Reay and Shewan *(15)*.

Among the bacterial flora of sea fish, our interest is centered on those types which are able to grow and bring about undesirable changes of quality under circumstances usually occurring in the fresh fish industry, i.e. at ice temperatures. Total bacterial counts have their value in indicating sanitary conditions in the vessels or plant and, to a limited extent, future keeping quality prospects of the fish at the time of examination. On the other hand, a specific count of those bacteria which are able to reduce at ice temperatures the trimethylamine oxide of fish flesh to trimethylamine, would provide us with much more accurate information in judging the keeping quality of the fish, especially of non-fatty fish. Bacterial numbers as such have little meaning until they are translated into bacterial activity of specific kind.

Reduction of Trimethylamine Oxide

It has been shown by a number of workers that marine fish flesh contains trimethylamine oxide, the amounts of which vary with different species and within a species according to season and locality. It has also been demonstrated that this substance can be reduced to trimethylamine by certain bacteria, the responsible enzyme being a specific one, triamine-oxidease *(16)*. It is generally agreed that trimethylamine and dimethylamine production are measurable processes which can be closely related to organoleptic tests of incipient and advancing fish spoilage *(5, 9)*, in non-fatty marine fishes at least. Considerable work has been done also with herring. Furthermore, comparatively easy and rapid laboratory tests have been developed which allow such spoilage to be followed not only in the research laboratory but also in the plant control laboratory.

The trimethylamine production occurs parallel with the bacterial conversion of the lactic acid to acetic and other volatile acids. Proteolysis does not become important until spoilage is well advanced *(1)*.

Trimethylamine determinations are most valuable in obtaining the degree of spoilage of the fish flesh at any particular stage (provided the activity of the specific enzyme has not been interfered with as, for example, by the use of preservative substances such as nitrites). Unfortunately they ordinarily do not allow to predict the keeping quality of the fish in the early stages of spoilage or in the case of fillets, of unknown previous history.

It has been shown that the enzyme activity is greatly influenced by the pH, the optimum being above 8.0 for enzymes of most fish spoilage bacteria. There is markedly less activity when the pH is below 7.0. This may in part explain why, for the Atlantic coast ground fish, in which the pH rises rapidly to 7.0 and higher, the trimethylamine test has been found much more satisfactory than for many Pacific coast fish which have a lower initial pH *(17)*.

Recent work on volatile acid determinations appears to promise a test with more nearly universal application *(11)*.

Marine Bacteria Are Psychrophylic

Many bacteria which are very active in reducing trimethylamine oxide and in causing proteolysis at "room temperature," are completely inhibited at ice temperature. On the other hand, most marine bacteria isolated from the cool waters in the Northern hemisphere have been found to be able to grow, although more slowly, at ice temperatures and even down to 10° F. (—10° C.). This, of course, complicates the problem of preserving fish by means of chilling. It definitely limits their total keeping time to a matter of two to three weeks under favorable circumstances. Not only will marine bacteria grow at these temperatures, but they may, in time, even produce larger total crops than at room temperature. While, at first sight, this might all sound very discouraging, another factor enters into the picture and indicates a practical way of overcoming our difficulties. This is the fact that near

the freezing range the temperature coefficient of bacterial growth is much higher than at room temperature *(7)*. In plain language, this means that the lowering of the temperature by, say, 2° F. in the freezing range is several times as effective as lowering the temperature by the same number of degrees in the room temperature range. In fact a greater reduction in the bacterial growth rate is achieved by lowering the temperature from 37° F. (2.7° C.) to 31.5° F. (—0.3° C.) than by lowering it from 77° F. (25° C.) to 37° F. (2.7° C.). Similarly, the temperature, coefficient of activity of the enzymes of marine bacteria, including triamineoxidease, is quite high near the freezing point. A lowering of the storage temperature of cod fillets from 37° F. to 32° F. doubled their keeping quality, the actual time depending upon their original quality, while in the room temperature range it would have required a lowering by 40° F. to have achieved the same result *(3)*. Each single degree by which we can lower the temperature of all the fish in storage becomes increasingly more effective and important the closer the freezing point of the fish flesh is approached.

A group of lipolytic bacteria has recently been isolated from cod held at 32° F. (0° C.), constituting some 86 percent of 467 cultures. Although ground fish contain only about 0.5 percent fat, the fact that bacterial lipases are little affected by low temperatures may account for some of the flavor changes in chilled and frozen fish *(4)*.

Principles of Controlling Fish Spoilage Bacteria

Control of any undesirable bacteria can be attempted by at least four means: first, by preventing, insofar as possible, bacteria from gaining access to the fish flesh, which is mainly a problem of handling and preparing the fish under sanitary conditions; second, by preventing those bacteria which have contaminated the fish flesh in spite of all precautions from reproducing themselves; third, by inhibiting insofar as possible the activity of enzymes which really cause the fish spoilage; and fourth, by keeping the interval between catching the fish and its consumption as short as possible. It is agreed, of course, that the ideal control would be to kill the bacteria at an early stage, but no practical method has been reported as yet which will accomplish this without altering the fresh fish flesh in some way.

Spoilage Control

Regarding the first factor, that of *contamination* of the fish flesh, it has already been mentioned that the fish flesh is sterile to begin with and that the bacteria enter it, from the surface slime, through the skin or, from the intestinal contents through the linings of the belly cavity.

The impounding of live fish of the sardine and herring types to allow their intestinal contents to be eliminated and thus cease to be a source of bacteria for contaminating the fish flesh is a well known method of spoilage control exercised, particularly by canners, in various parts of the world.

The contamination of the flesh may be speeded up by any kind of rough handling of the fish, by the cutting of the skin, by the gutting operation and by heading of the fish, which helps to spread the intestinal contents over the cut surfaces of the flesh, unless the gutting is followed immediately by thorough washing. The reference to heading applies to the British wartime practice of heading trawler-caught fish at sea, which also delays the handling of the fish on deck. However, heading may assist in proper bleeding of the fish and is required for this reason in Norwegian shore-caught fish.

The initial bacterial load varies with the season, being highest in the North Sea, for example, in August. Trawler-caught fish have a higher load than line-caught fish, partly on account of the dragging of the trawl along the bacteria-rich bottom mud, and partly because of the squeezing out of the intestinal contents by the pressure in the trawl. Prolonged holding of fish on deck will also increase their bacterial load. This is particularly true in warmer weather. The original bacterial load of the fish is also increased by its contact with dirty surfaces on the deck and in the hold of the fishing vessel. Gradual replacement in modern trawlers of wooden boards and partitions on decks and in holds by non-corrosive metal is showing the way to reducing contamination of the fish from these sources.

Apart from the effects on the growth rate and activity of bacteria, low temperatures also retard penetration of the fish skin by bacteria. While after four days of holding at 45° F. (7° C.) many hundreds of millions of bacteria could be counted per square centimeter of the inner dermis and outer muscle layers, at 32° F. (0° C.) no significant penetration of the skin occurred in the same period.

It follows that fish should be thoroughly hosed on deck before gutting and thoroughly washed afterwards to remove as much of the contamination as possible.

Contamination during the filleting operation has received considerable attention in recent years. It has been shown that the keeping quality of the fillets depends largely upon the bacterial load they receive at the time of filleting rather than upon the length of previous storage. Since the greatest part of the contaminating bacteria are discarded with the skin and the skeleton, the total keeping time of iced fish can be increased by filleting. On the other hand, the fish slime contaminates filleting boards, knives and filleter's gloves so rapidly that they in turn recontaminate the fillets. With increasing age of unwashed fish, increasing contamination of the fillets occurs. By thorough mechanical washing of the fish before filleting the bacterial load on the fillets may be reduced by some 98 percent. It is obvious that the larger the contamination of the fillets, the faster they will spoil. For instance, 100 to 1,000 bacteria per cm.^{2} will cause spoilage in 9 days; 10,000,000 per cm.^{2} in 4 days *(2)*.

Well organized systems of fish plant sanitation, involving cleansing and chlorination *(10)*, have proved that reducing the chances of contamination of the fish to a minimum at all stages of handling, from the sea to the consumer, increases quality of the products.

Since under commercial conditions some contamination will always occur, the second means of controlling spoilage, that of *inhibiting bacterial growth*, becomes most important.

Commercially the chilling of the fish is the most practical and effective means of controlling bacterial growth as well as spoilage action. Where the industry has lagged behind is in the realization of the importance of lowering the fish temperature right down to 32° F. to 30° F. (0° C. to —1° C.) as quickly as possible and maintaining it there. The chilling of sardines and sprats in cold, weak brine or sea water is a commendable exception *(12)*. Temperatures of over 40° F. (5° C.) of fish in some parts of vessel holds are not uncommon, and in view

of our earlier statements, are largely responsible for some of the poor quality of fish landed. If this coincides with long fishing voyages, extending not only to a number of days but weeks, the limit of the keeping quality of the catch is stretched beyond the breaking point and at time of landing the earlier part of the catch is only fit for the fish meal plant. Low hold temperature storage is faced by two problems, first by an engineering one involving vessel design, hold insulation, refrigeration, etc. and second, by a human one, involving the proper training and supervision of the crew primarily responsible for the handling and stowing of the catch aboard. It has been observed on many occasions that two vessels of the same type and under the same fishing conditions may bring in catches of consistently different quality, due primarily to more responsible and intelligent stowing procedure in one case than in the other.

Tests have shown that in order to cool all the fish in the holds rapidly to 32° F. (0° C.), it is not sufficient to pile large quantities of ice on deep layers of fish. Fish in the centers of such holds may never reach 32° F. or even 36° F. (2° C.) during the return trip. Even the center of 15-inch (38 cm.) layers of fish will take 3 days to cool to 32° F. *(14)*. Only when the ice is near the fish, as in stowing alternate layers of ice and shallow layers of fish, will the temperature of the latter be lowered to 32° F. rapidly enough to be effective in retarding spoilage. It is known that the ice will melt most rapidly at the outside walls of the hold, i.e. at the skin of the vessel, under the deckhead and on the inside walls of the pens. Commercial tests have shown that auxiliary mechanical refrigeration assists greatly in preserving the ice in these locations and in maintaining uniformly low hold temperatures, particularly when this is combined with proper hold insulation augmented by jacketing. In comparative trials such boats have consistently brought in catches of higher quality than have boats with or without hold insulation and without mechanical refrigeration. In some European fishing vessels the fish, especially small fish, flat fish and the early catch of the trip, are boxed and iced aboard, thus allowing a catch of superior quality to be landed.

All that has been said concerning the effects of low temperatures on bacterial growth applies equally to the *activity of bacterial enzymes*, although some enzymes are affected less than others, e.g. the reduction of nitrite and proteolysis by certain organisms are less retarded at 31° F. (—0.6° C.) than is the reduction of nitrates and trimethylamine oxide. Also, some bacterial enzymes are active below the growth range of the bacteria.

It has been shown that concentrations of nitrites greater than 50 p.p.m. interfere with the activity of the triamineoxidease. However, the presence of small concentrations of nitrites does not necessarily interfere with bacterial growth, except at low pH. Most bacteria capable of reducing trimethylamine oxide will also reduce the nitrite. Nitrite dips have proved an effective treatment for inhibiting trimethylamine oxide reduction in fillets of such fish as cod and haddock, thereby increasing the keeping quality of the fillets. However, the effect is limited to a pH range below 7.1, i.e. to fillets of really fresh fish. Nitrite dips are of little value for heavily contaminated fish; their use should be restricted to the early stages of handling the fish.

The European system of de-icing and boxing the whole catch to display it on the fish docks for inspection and auction has one great disadvantage. The fish are held thus uniced for several hours, which, especially in warm weather, is particularly harmful to the earlier portions of the catch which may have just reached that stage in the course of spoilage when the rate of spoilage has accelerated after the initial lag.

Another delay in cooling of fish, particularly fillets, occurs when they are shipped in wooden boxes which are merely surrounded by crushed ice, the fish not having been precooled. Tests have shown that it took 48 hours to cool fish in the center of 20 lb. boxes, held in a room of 25° F. (—4° C.) (equal to refrigerator car conditions), from 50° F. (10° C.) to 32° F. (0° C.) *(13)*.

From this it can be seen that the pitfalls are many in the long chain of events from catching the fish to putting it on the consumer's table, particularly when the time element is unfavorable, either on account of long fishing voyages or long distances of distribution from the fishing ports to inland centers. In some instances the limits within which fish can be marketed as really fresh fish have already been reached, in spite of all methods of control indicated so far. The solution of this problem, as seen in many parts of the world, lies in the quick freezing ashore, or in case of long voyages, possibly in quick freezing aboard.

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Drying by Infra-Red Radiation[a]

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Disappointing results are avoided by fundamental knowledge of the absorption curve of the material to be dried by infra-red radiation. Usually efficiency must be sacrificed to avoid surface overheating. However, other advantages compensate for loss of efficiency.

Infra-red radiation has aroused new interest in recent years. The development of concentrated, controlled and safe sources of infra-red in the form of electrically heated enclosed filaments has spurred its introduction into several fields, particularly in industrial drying.

Many food technologists have tried infra-red radiation for drying their pet product. There have been an almost equal number of disappointments. We say an almost equal number because in spite of all that is claimed for infra-red drying, all that has been written about it, and all the work that has been done with it, the resulting commercial applications to food processing have been few indeed. These few applications include concentrating and drying products of the sugar industry *(1)*, grated codfish, potatoes, toasted wheat germ, bread crumbs *(2)*, and a variety of fruits and vegetables *(3, 5)*.

We believe that the large number of disappointments is due to a lack of information on the fundamental properties of infra-red radiation. If this information were available and if it were taken into consideration by the food technologist before starting his project, he would be saved disappointmnet.

Infra-red has its place in drying technology, but it is not the panacea for all drying problems. It appeals because it penetrates and produces heat inside the material being dried, but its penetrating powers are limited. Sometimes its limited penetrating power is advantageous, but at the same time limited penetrating power means high surface heating and usually this is to be avoided if possible.

It is our objective here to describe some of the fundamental properties of infra-red and to present three preliminary steps which one should take before applying infra-red to any drying problem.

The following three factors are essential in understanding how infra-red heating functions:

The first is a fundamental law of light absorption. Each hypothetical layer of a given material absorbs the same percentage of infra-red energy impinging on it. Of course, the percentage varies with the material. Naturally, it is impossible to have uniform absorption of energy throughout a given thickness of material. Since the amount of energy reaching successive layers of material is constantly being reduced by absorption in the previous layers, the amount of absorptoin must necessarily decrease as the depth into the absorbing material increases. The nature of this variation with depth into the material is shown in Figure 1 where the absorption at successive depths is plotted for three different sources of infra-red energy.

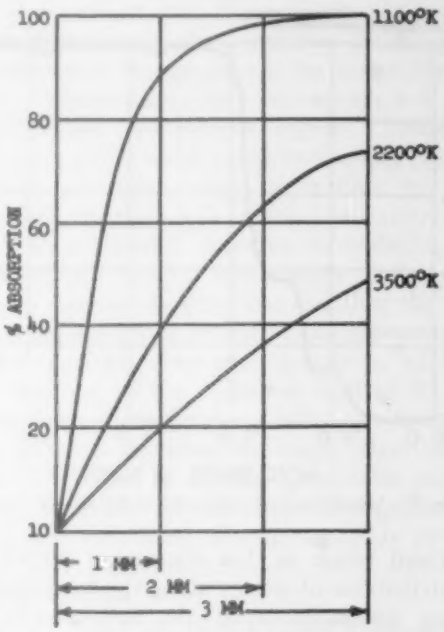

FIG. 1. The fundamental law of light absorption.

It is seen that for the 1100° K [b] source, absorption in the material is high and a large portion of the energy is absorbed very near the surface of the material,—in fact, approximately 50 percent of the energy is absorbed in the first 0.5 mm. depth. Such a condition leads to high efficiency of heating since over 99 percent of the energy is absorbed in the 3 mm. depth, but it also results in surface heating.

This illustration also shows that heating is far from uniform at all depths.

On the other hand, the energy from the 3500°K source is not so strongly absorbed and therefore penetrates more deeply into the material. This approaches uniform heating throughout the thickness but at the same time efficiency is lost because of the high transmission through the 3 mm. depth.

The 2200°K source might represent the best choice for heating this material. It represents a compromise between the high efficiency of the 1100° K source and the low surface heating of the 3500°K source.

The second important fact about infra-red heating is that the percentage of absorbed energy varies with the wavelength of the energy. The manner in which absorption of infra-red varies with the wavelength is

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[b] °K equals °C + 273. K stands for Kelvin. It is an absolute temperature scale.

illustrated in Figure 2, representing the approximate absorption curve for a 3 mm. thickness of water. Wavelengths longer than 1.4 microns are completely absorbed. Between this wavelength and the visible region starting at approximately 0.7 microns, the absorption is variable.

In order to control the depth of penetration of the energy into the material, one must know the absorption characteristics of the material and choose, if possible, a wavelength which has the desirable absorption characteristics.

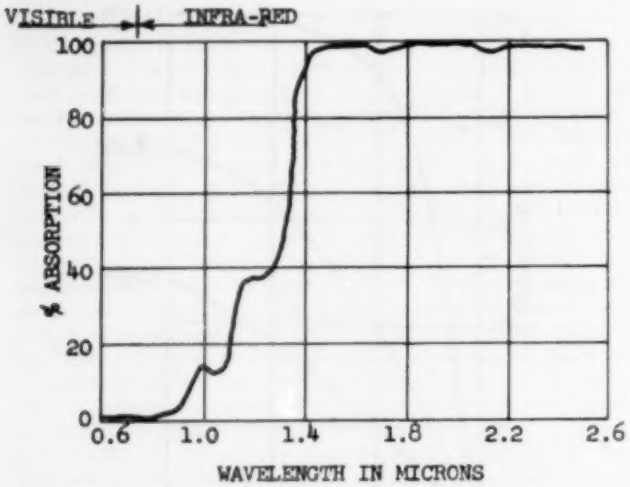

FIG. 2. Absorption of infra-red radiation by water.

The third factor is that sources of infra-red have wide distributions of energy along the wavelength scale, depending primarily upon the temperature of the source.

Unfortunately, it is impossible to choose a source having a single wavelength. Heated bodies, which are the sources of infra-red energy, give off wavelengths over a wide range. Typical distribution curves are shown in Figure 3. True, there is a wavelength of

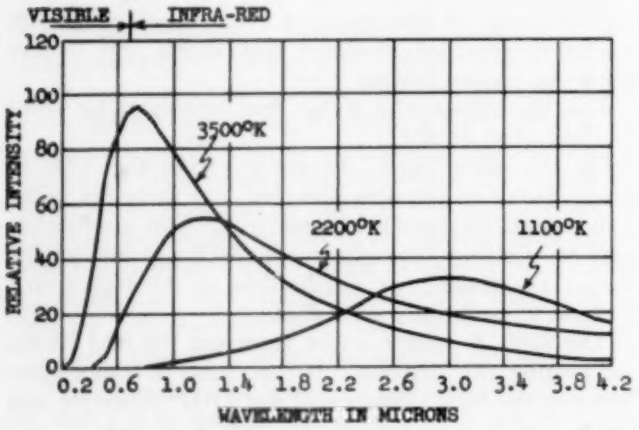

FIG. 3. Relative intensities of various sources of infra-red radiation.

maximum energy for each source and this wavelength maximum varies with the temperature of the source. However, this maximum represents only a small portion of the total energy and to utilize infra-red economically, it is necessary to use a broad band of wavelengths.

The curves in Figure 3 are drawn so that the total heat energy is the same for each curve. Actually, the total energy output of a heated filament decreases rapidly as its temperature is lowered. This becomes an important factor in some applications. For example, in using very low temperatures, a very large heating surface is necessary and it may not be practical to use enough heating surface to obtain the desired amount of heat transfer.

The above mentioned three properties of infra-red radiation are essential to an understanding of how it functions. Now let us consider the three steps which should be followed in applying infra-red to a drying problem.

The first step is determination of the absorption characteristics of the material to be dried. Let us assume that we are going to dry the material represented by the curve in Figure 2. This curve represents the approximate absorption in a 3 mm. thickness of water. We will assume that this curve has been obtained on an infra-red spectrophotometer.

The second step is to choose a light source. Suppose we choose the 2200°K light source shown in Figure 3.

The third step is to apply the fundamental law of light absorption. For this purpose the radiation source curve is shown on the same chart as the absorption curve for water in Figure 4. At wavelengths above 1.4

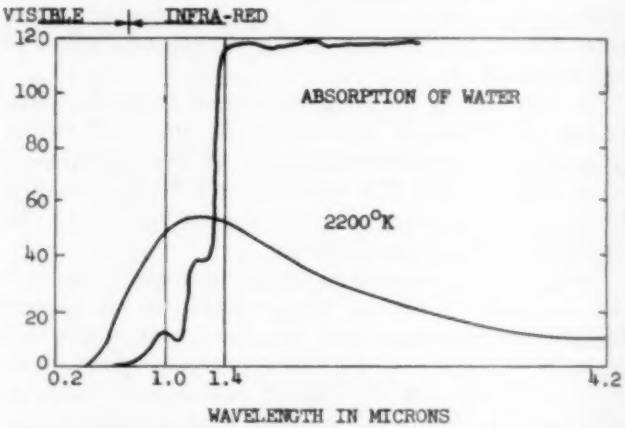

FIG. 4. Application of fundamental law of light absorption.

microns, radiation is almost completely absorbed by the water. The portion of total energy from the light source, represented by wavelengths above 1.4 microns, is approximately 65 percent of the total energy of the lamp. This is measured by the area under this portion of the curve. Thus, at least 65 percent of the total energy is completely absorbed in passing through the water.

Between wavelengths 1 and 1.4, the absorption of water is variable, perhaps on the average it is in the neighborhood of 40 percent. Also, the area under the radiation curve between these wavelengths is about 20 percent of the total energy. Thus, approximately 40 percent of 20 or 8 percent of the total energy is absorbed and 12 percent is passed through the water film.

For the wavelengths shorter than 1 micron, the absorption of water is very low and this range represents approximately 15 percent of the total energy as measured by the area under the radiation curve. Thus,

TABLE 1

Transmission and Absorption of Infra-Red Radiation from a 2200°K Source in 3 mm. Thickness of Water

Wavelength Region	Percent of Total Energy Transmitted	Percent of Total Energy Absorbed
Above 1.4 microns	....	65
Between 1 and 1.4 microns	12	8
Below 1 micron	15	....
Total	27	73

we have in this region none of the radiation absorbed and about 15 percent of the total energy transmitted.

The above results are tabulated in Table 1. By adding up the two columns, it is seen that approximately 73 percent of the total energy is absorbed and 27 percent is transmitted by a 3 mm. thickness of water. Referring back to Figure 1, it is seen that these figures correspond very closely to the curve for the 2200°K source. Thus the distribution of absorption in the various layers of water will be as represented by this curve in Figure 1.

The choice of the 2200°K source is obviously a compromise between excessive absorption in the surface layer on the one hand and high transmission of energy through the sample on the other. Naturally, if a light source similar to 3500°K in Figure 3 had been chosen, the figures for percent transmission through the water would have been higher and we might have ended up with a condition represented more by the 3500°K curve in Fgure 1. If we had chosen a light source represented by 1100° K in Figure 3, a much greater portion of the total energy would have been absorbed by the water film, and the conditions would be more nearly represented by the 1100°K curve in Figure 1.

The above discussion neglects entirely the absorption of radiation in the dry product. This too is important and should be taken into consideration. In many food products it is highly desirable to avoid heating the dry product as much as possible. To determine the extent of heating in the dry product one should follow the same procedure as outlined above; that is, obtain the absorption curve for the dry product and determine the extent to which the particular energy source will be absorbed in this material.

The above technique of avoiding disappointments in the application of infra-red drying may be further illustrated by actual example from our own laboratories. We were interested in drying orange juice. For this purpose we were using an approximately 1100°K source in the belief that radiation from this source was selectively absorbed in the water and not appreciably absorbed in the dry product. In this way we thought we were obtaining a dried orange juice powder which was not being overheated. It is well known that orange juice is particularly susceptible to flavor changes when it is heated. It was our objective to avoid these flavor changes.

The absorption curves for the orange juice and the dry orange juice powder are shown in Figure 5. It is seen that the orange juice has a minimum in absorption in the range between 3 and 4 microns, whereas the dry orange juice solids have a maximum in absorption in this same region.

The radiation curve for the light source is also shown in Figure 5 for comparison with the absorption curves of the other materials. It is seen that this radiation source has a maximum in the region of 4 microns.

We have applied so far steps 1 and 2 in the above mentioned procedure. Step 3 is to apply the fundamental laws of light absorption. When we do this it is perfectly obvious that this particular light source is not going to be selectively absorbed in the orange juice, instead this is the region of maximum absorption by the dry orange solids. The reasons why the process was not satisfactory become apparent immediately.

It is also evident that the only wavelength region which would approach the conditions of desired selective absorption in orange juice is the range from 5 to 7 microns. Unfortunately, light sources are not available for this limited wavelength region. Instead, they extend over a much wider range and would extend into the regions of high energy absorption by the dry orange solids on either side of the 5 to 7 micron range. There is an additional objection to radiation in this long wavelength range: The energy output from a given sized filament is very low and thus the capacity of the drying apparatus would be correspondingly low.

The fundamental absorption properties of the supporting medium, or the container holding the sample, must be also considered. Ordinary Pyrex glass strongly absorbs wavelengths longer than about 2.8 microns. Therefore, it absorbs appreciable portions of the energy from any source. Some of the plastics, such as Nylon and Polythene, absorb negligible amounts of infra-red and therefore they are very suitable as a supporting medium.

When the radiation passes through the supporting medium to reach the sample, all advantages of the penetrating power of infra-red are lost if strong absorption takes place in the supporting medium. It becomes hot, and heat is transferred to the sample by conduction.

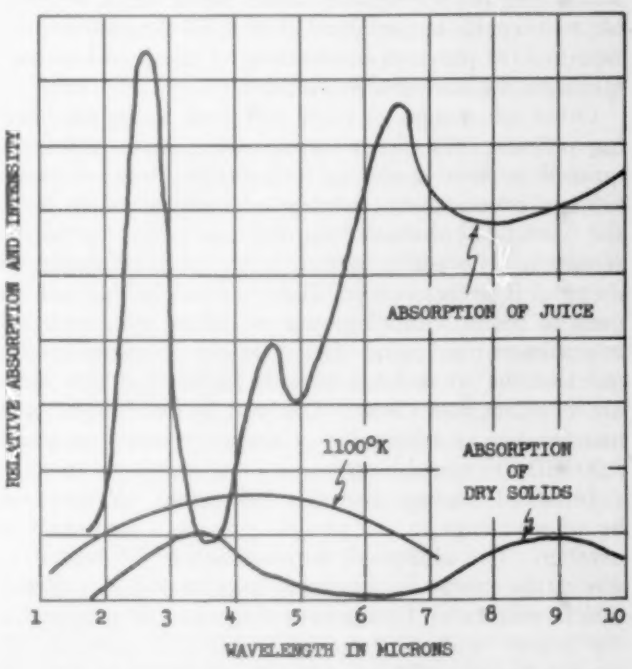
RELATIVE ABSORPTION AND INTENSITY
ABSORPTION OF JUICE
1100°K
ABSORPTION OF DRY SOLIDS
1 2 3 4 5 6 7 8 9 10
WAVELENGTH IN MICRONS

FIG. 5. Drying of orange juice by infra-red radiation.

When the radiation passes first through the sample and then through the supporting medium, the radiation not absorbed by the sample may be absorbed in the support and heat it. It is always desirable to avoid absorption in the supporting medium.

Another thing we found wrong with the above mentioned process of drying orange juice was absorption in the supporting medium. The juice was supported on a Pyrex tray and infra-red was applied from below through the tray. When the absorption characteristics of the glass were determined, it was seen immediately that about 80 percent of the radiation from the 1100°K source was absorbed in the glass. So it would seem that infra-red is not an ideal type of heating for producing heat within the material. Instead various degrees of surface heating take place depending upon the absorption characteristics of the material being heated and the temperature of the source from which the infra-red energy comes.

There can be only limited control over the factors which affect the degree of surface heating, such as the variation of absorption with wavelengths and the distribution of wavelengths in the source of energy. In spite of these limitations, the method was found useful in processes where temperature control is important.

There are clear advantages to the use of infra-red within the limits of its capabilities. The chief advantage of radiant heating is the elimination of resistance to heat transfer at gas to solid interfaces, such as exist in convection type heating, and at metal to liquid interfaces, such as exist in conduction type heating. This results in a saving in time of processing and better control of surface temperature, particularly for granular materials which are so often encountered in food processing.

A particular advantage of infra-red for evaporating heat sensitive liquids has been pointed out by Reavell *(4)*. Using as a container for the liquid a material which does not appreciably absorb infra-red, it is possible to keep its temperature at that of the evaporating liquid. This prevents overheating of the liquid in contact with the wall of the container.

Other advantages of using infra-red lamps for heating include: (1) Space saving, since lamp banks require little floor space; (2) Flexibility, because variations in grouping and arrangement can be made to fit the work; (3) Instant heat with no warm up period required, no standby power costs, no overheating of material if process stops. Automatic switching can be used to permit heated section to follow the work for intermittent feed; and (4) Pleasant conditions,—the fact that the air is not materially heated and that units are compact and clean. The cost of investment and maintenance is reasonable. Lamps are rated at about 5,000-10,000 useful hours.

Infra-red heating also has limitations. What may be an advantage in one process may be a limitation in another. The ability of the material to be heated to absorb the energy is of primary importance. A material which reflects or transmits an appreciable amount of the energy will not heat well. Metallic surfaces are good reflectors. White and red colored materials will reflect a considerable though not a major portion of the energy. On the other hand, if the material is too good an absorber, then the energy will be absorbed in the surface layer and the interior must be heated by conduction.

In relation to the control of surface overheating, infra-red lies in between dielectric heating where there is no surface overheating, and conventional types of conduction heating where the surface must be overheated.

Although low cost had previously been mentioned as an adantage, each application is different and the costs must be compared directly with other methods. In general, experience has shown that the capital investment, maintenance, and replacement costs are low. Operating efficiencies average about 90 percent, which means that this much of the power drawn from the lines is converted into useful radiant energy. Overall efficiency will depend upon the degree of absorption of this radiant energy in the material being heated, but practical applications indicate values of about 65 percent.

Radiant heating with infra-red lamps should be considered whenever a new process is being designed or an old one modernized. A properly designed system has in many cases (including several in the food field) proved to be cheaper than the older system. In addition, because of better temperature control, infra-red heating resulted in a superior product.

Summary

The use of infra-red for drying often leads to disappointing results. This is due to popular misconceptions. It is avoided by preliminary determination of certain fundamental information. The authors present three steps for doing this:

1. Determine absorption curve for material to be dried.
2. Choose heat source.
3. Apply fundamental law of light absorption.

In applying these steps to evaporating water, one finds a limited choice of heat sources. Final choice represents a compromise between low efficiency and high surface heating. To avoid overheating, the absorption curve for a dried product is just as important as for the starting material.

Advantages of infra-red are:

1. Some control over surface overheating.
2. Low space requirement.
3. Flexibility in spotial arrangement of heaters.
4. Instant heat on and off.
5. Pleasant working conditions.

The cost of infra-red drying varies widely. It must be calculated for each application.

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Acidification and Calcium-Firming of Canned Pimientos[a]

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Immersion of blanched pimientos in weak citric or acetic acid or deposition of a definite quantity of acid directly in the can were simple means of lowering the pH of the canned product from pH 4.95 to 4.5 so as to permit present processes at 212° F. to be used with less danger of spoilage. Direct deposition of the acid in the can resulted in greater uniformity in pH than acidification by immersion. Citric acid tablets would appear to be easier to use than deposition of a liquid acidulant. Acidification did not affect the color. Although the added acid modified the flavor, only acidification below pH 4.3 resulted in too drastic a change in flavor. Acidification increased the drained weight of the product significantly. The use of both an acidulant and calcium chloride resulted in a highly significant increase in drained weight and in firmness of the canned product.

Introduction

Because of spoilage in 1947, the Georgia pimiento canning industry sponsored research in 1948 to ascertain how such spoilage could be stopped. Pimientos are processed commercially at 212° F. (100° C.). Although longer water bath cooks or pressure cooks would undoubtedly prevent spoilage, both are objectionable because they soften the product excessively. Since severe cooks are undesirable, acidification was used as an alternate procedure to bring the heat resistance of the organisms within the lethal range of present water bath cooks. Acidification appeared to be desirable not only to prevent spoilage, but, as the study progressed, as a means of eliminating danger of food poisoning. The first phase of the study, previously reported *(20)*, showed that pimientos are less acid than has been generally thought and have an average pH of 4.95.

Review of Literature

Sane et al. *(20)* found that the pH of canned pimientos ranged from 4.6 to 5.2. Values as high as pH 5.5, though rare, have been encountered *(20)*. Culpepper et al. *(4)* were among the first to observe that the pH of red pepper may exceed 5.0. These workers stated that peppers, whether red or green, should be processed only under pressure.

Although pimientos are water-bathed and are generally close to pH 5.0, no outbreaks of botulism due to commercially canned pimientos are apparently known. There is evidence, nevertheless, that red pimientos can support the growth of *Clostridium botulinum*. Schoenholz et al. *(21)* inoculated canned pimientos with detoxified spores of *Clostridium botulinum*. Weak toxin production was demonstrated. However, these cans were not heated after inoculation. The reviews of Esselen *(6)* and Wylder *(25)* list outbreaks of botulism resulting from ingesting home-canned peppers. Most of the outbreaks involved green peppers. Green peppers are much higher in pH than red peppers *(20)*. To determine whether danger exists when red pimientos are water-bathed, the National Canners Association has set up comprehensive studies to establish the pH levels at which pimientos will support growth and permit toxin production *(23)*.

Pimientos support the growth of at least three spore-forming anaerobes characterized by a gassy, butryic, cheesy smelling fermentation *(18)*. The chief troublemaker is possibly an organism of the *Clostridium pasteuranium* type.

One reason why spoilage occurs is that heat penetration in the cans is slow *(23, 24)* due to tight packing and layering of the product. Acidification has been used off and on in the industry to decrease the thermal resistance of the spoilage organisms. Fellers *(9)* recommended that the 28-ounce cans be acidified with distilled vinegar which appears to be more toxic toward many microorganisms than other common edible organic acids. Levine and Fellers *(14, 15)*, Erickson and Fabian *(5)*, Morse et al. *(16)*, and Anderson et al. *(1)* have reported upon the toxic action of acetic acid toward different microorganisms. Some of these studies *(1, 5)* suggest that acetic acid is more inhibitory toward some acid-tolerant, spore-formers than are citric or lactic acids. Both acetic and citric acids have been investigated as acidulants for pimientos by the National Canners Association *(2)* and Wessel and Roberts *(23)* investigated acidification simultaneously with this study.

Acidification is often used commercially for Brussel sprouts, onions, artichokes, and potato salad because these products become mushy when cooked under pressure *(22)*. However, mushiness in foods has not only been combatted by adjusting the pH to permit mild cooks but also by adding firming agents *(13)*. Calcium salts have become established, legal firming agents in the canning of tomatoes and in frozen apples *(3, 7, 8, 10, 11, 17)*. Powers and Sane *(19)* observed, based upon limited studies, that a combination of an acidulant to inhibit spoilage organisms and calcium chloride to retain a firm texture permitted pimientos to be water bathed without spoilage and with little softening.

Experimental Procedure

Five experimental packs consisting of 947 four-ounce cans (211 × 200) were packed in two canneries. The pimientos were acidified: (1) by submersing them in acids of various strengths for different periods of time, then permitting them to drain for 15 seconds; (2) by depositing an accurately measured volume

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of acid directly into the can, or (3) by depositing tablets of anhydrous citric acid containing 100 mg. of acid in the can. Acetic, citric, phosphoric, and hydrochloric acids were tried in the first pack. Hydrochloric acid was used without intention of practical application. Some packs also included cider vinegar. At present both citric acid and vinegar are allowed as acidulants for pimientos *(2)*.

Combination treatments consisting of both an acidulant and calcium chloride were packed in two ways: (1) various combinations of the acidulant and calcium chloride were prepared and the pimientos were dipped as described above, and (2) the acidulant-calcium chloride mixture was added directly to the can. The maximum amount of calcium chloride in any of the dipping solutions was 1 percent and that added directly to the cans was 0.07 percent, based upon a 4-ounce fill. Actually the 211 × 200 can holds 118.3 grams of water at 68° F. (20° C.).

Immediately following processing and at intervals thereafter, the pH, total acidity, buffering capacity, and drained weight of the contents were determined. The procedures followed are described in a previous publication *(20)*. The organoleptic qualities of selected lots were evaluated by a standardized taste-panel and the firmness was measured by determining the force required to drive a disk of 1.9 cm. diameter through the pod.

Experimental Results

Immersion of pimientos in 1 percent citric acid for 1.5 minutes or in 2 percent acid for one minute, followed by 15 seconds draining, lowered the pH of the canned product to pH 4.5. If pH 4.7 is accepted as the desired degree of acidification *(2)*, then a 1.5 minute dip in 0.5 percent citric acid or a 30 second dip in 1.0 percent acid would suffice. When 5 percent vinegar was used as the acidulant, a one minute dip was necessary to lower the pH to 4.5. Immersion in 1 percent phosphoric acid for one minute also lowered the pH to 4.5. The effects of other acids, concentrations, and dipping times may be seen in Table 1.

Because citric acid and acetic acid (vinegar) are permitted as acidulants by the Food and Drug Administration, the choice of acidulants naturally narrows down to these. As will be pointed out later, citric acid is more desirable than acetic acid because it modifies the flavor less; however, acetic acid may permit shorter cooking times to be used at equal pH levels because of its greater germicidal action *(1, 5)*.

Although immersion is a satisfactory mode of acidifying, it has certain disadvantages, among which are: (1) maintenance of the desired acid concentration in the bath, (2) lack of uniformity due to pods occasionally acting as cups during draining with the result that excessively unequal amounts of acid are carried into the cans, and (3) wastefulness.

Direct addition of the acidulant to the cans resulted in more uniform pH levels than immersion. Both liquid and solid acidulants were equally effective. Because tablets can be deposited with conventional machines, the use of pelleted citric acid would appear to be particularly desirable in terms of automatic operation with minimum care and readjustment of existing packing lines.

The direct addition series showed that early in the season from 200 to 250 mg. of citric acid monohydrate added to 4-ounce cans will reduce the pH to approximately 4.5. Late in the season from 150-180 mg. were required. In general, as the season progressed, less citric acid was required to lower the pH to 4.5. When acetic acid was used, 500 mg. per 4-ounce can was required early in the season. When 0.07 percent $CaCl_2$ was added in conjunction with the citric acid, from 115 to 145 mg. of citric acid adjusted the pH to approximately 4.5. The effect of different amounts of citric acid alone and in combination with $CaCl_2$ may be seen in Table 2.

TABLE 1

Comparison of Various Acidulants, Acid Strength, and Immersion Period Upon the pH of Pimientos in 4-ounce Cans

Acid	Acid strength, percent	Calcium chloride present, percent	Immersion period in seconds	pH	Acidity (as citric), percent	Time in season
Citric	0.5	.....	60	4.82	0.227	Early
"	0.5	.....	90	4.65	0.264	"
"	1.0	.....	30	4.66	0.295	"
"	1.0	.....	60	4.63	0.332	"
"	1.0	.....	90	4.49	0.272	Middle
"	1.0	0.05	90	4.39	0.337	"
"	1.0	0.10	90	4.35	0.227	"
"	1.0	0.10	90	4.08	0.285	Late
"	1.0	.....	120	4.55	0.285	Middle
"	1.0	0.10	120	4.38	0.351	"
"	2.0	.....	60	4.46	0.373	"
"	2.0	.....	90	4.35	0.390	"
Acetic	0.2	.....	60	4.95	0.195	Early
"	0.2	.....	90	4.98	0.239	"
"	0.5	.....	30	4.85	0.240	"
"	0.5	.....	60	4.89	0.286	"
"	10.0	.....	60	4.16	1.33	Middle
"	10.0	.....	90	4.12	1.40	"
"	10.0	.....	120	4.36	1.40	"
" (vinegar)	2.0	.....	60	4.96	0.194	Early
" (vinegar)	2.0	.....	90	4.9	0.132	"
" (vinegar)	5.0	.....	30	4.96	0.179	"
Phosphoric	0.1	.....	30	4.95	0.207	"
"	0.1	.....	60	4.92	0.210	"
"	0.5	.....	60	4.95	0.189	"
"	0.5	.....	90	4.96	0.172	"
"	1.0	.....	60	4.47	0.377	Middle
"	1.0	.....	90	4.35	0.401	"
"	1.0	.....	120	4.31	0.406	"
Hydrochloric	0.01	.....	30	5.09	0.189	Early
"	0.01	.....	60	5.08	0.159	"
"	0.005	.....	60	5.10	0.193	"
"	0.005	.....	90	5.05	0.154	"
Control	.....	.....	.....	5.10	.....	"
"	.....	.....	.....	4.90	.....	Late

Examination of Table 2 shows that to attain any desired pH level, less citric acid was generally required when in combination with $CaCl_2$ than when the acid was used alone. Because of such variables as seasonal changes in the pimientos themselves and normal packing and sampling errors, there was considerable variation in pH at each level of acid added within each of the two treatments; nevertheless there was a definite tendency for the acid-$CaCl_2$ samples to exhibit lower pH values than the acid-treated samples when the same amount of acid was deposited in the cans. A series of packs put up in 1949 using different calcium salts in combination with citric acid also showed the same trend: combination of $CaCl_2$ with citric acid resulted in lower pH values than the use of the same amount of citric acid alone.

Color and Flavor

The various treatments did not affect the color of the canned product as judged by visual examination. The red pigment was also extracted in carbon bisulfite and its transmission measured at 10 mμ intervals in a Beckman Model DU spectrophotometer in the range of 220 to 1000 mμ. No appreciable differences existed in the absorption curves of the various samples.

TABLE 2

Effect of Amount of Acidulant Used Alone or With Calcium Chloride Deposited Directly to the Can Upon the pH of Pimientos

Acid	Mg. acid per 4-oz. can	Calcium chloride added, percent	pH	Acidity (as citric), percent	Time in season
Citric	70	.....	4.79	0.213	Late
"	70	.07	4.62	0.222	"
"	100	.....	4.65	0.250	Middle
"	100	.....	4.74	0.218	Late
"	115	.07	4.49	0.339	"
"	140	.....	4.58	0.260	"
"	140	.07	4.30	0.229	"
"	145	.07	4.35	0.272	"
"	150	.....	4.43	0.260	"
"	170	.07	4.35	0.264	"
"	180	.....	4.49	0.467	"
"	180	.07	4.34	0.256	"
"	200	.....	4.58	0.300	Early
"	225	.07	4.20	0.104	Late
"	240	.....	4.22	0.335	"
"	240	.....	4.27	0.314	"
"	240	.07	4.23	0.294	"
"	250	.....	4.43	0.412	Early
"	300	.....	4.23	0.510	Middle
"	310	.....	4.19	0.333	Late
"	310	.07	4.17	0.350	"
"	370	.07	4.17	0.350	"
"	500	.....	4.06	0.480	Early
Acetic	500	.....	4.36	0.556	"
" (vinegar)	500	.....	4.45	0.571	"
Acetic	500	.....	4.37	0.632	Middle
Phosphoric	150	.....	4.29	0.449	"
"	50	.....	4.69	0.317	Early
"	100	.....	4.66	0.315	"
Control	.....	.....	5.10	.....	"
"	.....	.....	4.90	.....	Late

The pimientos were tasted repeatedly by a trained tasting panel of six persons. Three housewives and a home economist were included in the panel to secure the homemaker's point of view as well as that of research workers. Four samples were tested at a time with one of the samples being a duplicate. The taste tests revealed that the judges could detect differences in acidity at increments of approximately 0.1 pH unit. In general, the acidity was not considered excessive until the pH was below 4.3. On a preference basis, some of the judges actually preferred the mildly acidified pimiento (pH 4.7-4.5) on the grounds that the flavor was more sprightly. Citric acid affected the flavor less than did acetic acid. Whenever $CaCl_2$ treated cans were included, the judges could invariably detect these cans by the firmer texture of the product. There was a tendency for the $CaCl_2$-acid treated pimientos to be rated slightly less acid than the acid-treated pimientos at the same pH level. Although the $CaCl_2$-treated pimientos were slightly bitter, it should be mentioned that the level of $CaCl_2$ chosen need not be as high as 0.07 percent. A more extensive series of packs put up in 1949, not completely analyzed yet, tentatively indicates that about 0.008 percent Ca derived from $CaCl_2$, calcium citrate, or $CaHPO_4$ provides adequate firming. This equals 0.022 percent $CaCl_2$.

Firmness

The results of firmness measurements are shown in Figure 1. Acidification did not significantly increase the firmness of pimientos over that of the control as judged by application of Student's "t" test at the 5 percent level. A highly significant increase in firmness occurred when $CaCl_2$ was used. The range and average values for each treatment are shown in Table 3.

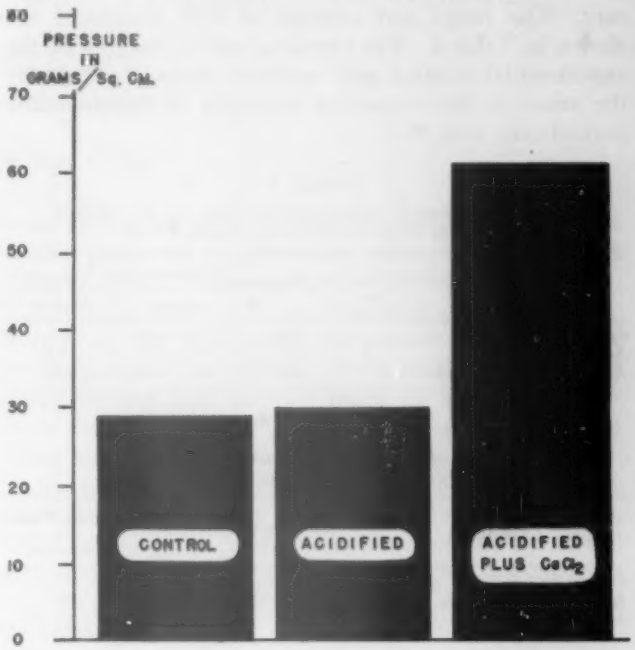

FIG. 1. Average pressure required to puncture 360 samples of canned (4-ounce) pimientos.

Drained Weight

Although only the combination treatment of $CaCl_2$ plus citric acid increased the firmness of the pimientos significantly, acidification both alone and with $CaCl_2$ increased the drained weight of the cans significantly over that of the control (Figure 2). The increase was significant at the 5 percent level. Acidification plus $CaCl_2$ resulted in a much greater increase in the average drained weight. This increase was highly signifi-

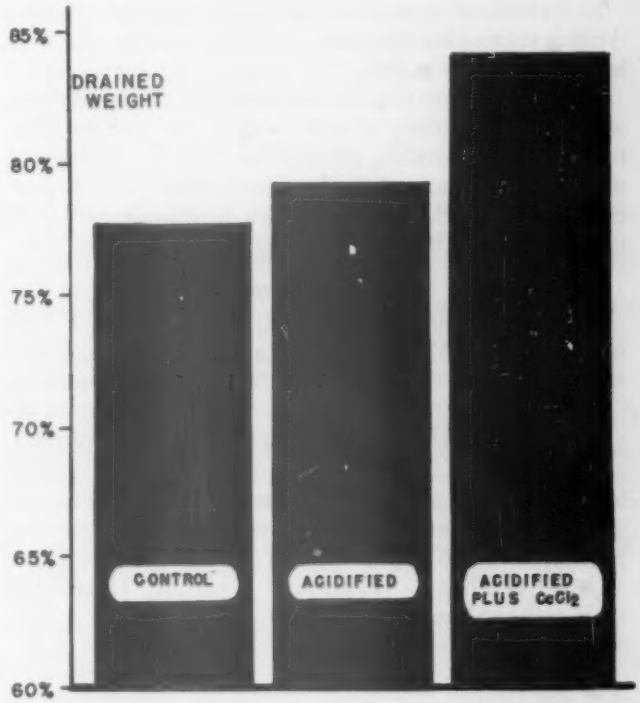

FIG. 2. Drained weights of 214 (4-ounce) cans of pimientos.

cant. The range and average of each treatment are shown in Table 4. The average drained weights of the experimental control and acidified packs were nearly the same as the respective averages of commercially packed cans analyzed.

TABLE 3

Effect of Acidification and Acidification Plus Calcium Chloride Upon the Firmness of Canned Pimiento Pods

Treatment	No. Samples	Pressure in g. per cm.²	
		Range	Average
Control	120	9.7-56.5	28.7
Acidification	120	7.9-77.8	29.8
Acidification plus $CaCl_2$	120	24.6-95.8	60.8

TABLE 4

Drained Weights of Experimentally Packed Control, Acidified, and Acidified Plus Calcium Chloride-Treated Pimientos

Treatment	No. Samples	Percentage Drained Weight	
		Range	Average
Control	45	70.0-89.0	77.7
Acidified	104	70.0-86.5	79.2
Acidified plus $CaCl_2$	65	75.0-90	84.1

Summary

1. Mild acidification of canned pimientos to a pH level of 4.7-4.5 did not adversely affect flavor or color. Citric acid affected the flavor less than acetic acid.

2. Depending upon the time of season, from 150-250 mg. of citric acid monohydrate was required per 4-ounce can to lower the pH to 4.5. When 0.07 percent $CaCl_2$ (based on the net weight of the contents of the can) was added as a firming agent with the acidulant, the pH tended to be lower than when the same amount of acid was added without $CaCl_2$.

3. The use of $CaCl_2$ resulted in the retention of a firm texture with standard and extra long cooks.

4. Acidification resulted in higher drained weights. Acidification plus firming with $CaCl_2$ lead to even higher drained weights.

5. Either immersion in an acidulant or the addition of a definite quantity of acid to each can was an effective means of adjusting the pH. In terms of uniformity, the direct addition method is preferable. The deposition of solid citric acid in pelleted form appeared to be the simplest method of acidifying.

Acknowledgments

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Effect of Irrigation on the Yield and Pungency of Onions[a]

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Six varieties of onions were grown and subjected to three different irrigation treatments. Even though the onions were grown part of the year when there were winter rains, the yield was increased by irrigation about 125 percent. Nonirrigated bulbs are slightly higher in dry matter or total solids but pungency is not greatly affected by the irrigation treatment.

The production of onion bulbs, of both early and late types, is one of a series of irrigation studies that has been made at this station. Results of the work with several other truck crops have previously been reported *(4, 10-14)*. Yield of onions, a shallow-rooted crop, has been appreciably increased by irrigation. This was true even though part of the growth was made during the rainy season, which occurs in California from November to April. The study presently described also includes the effect of irrigation on percentage of dry matter and on relative pungency.

Review of Literature

Numerous investigations have been made upon the effect of irrigation on onion yield. Fortier *(6)* in Utah made a report as early as 1893 and McClatchie *(15)* in Arizona about 1900. Other reports deal with onions grown in Missouri, Texas, Puerto Rico, Illinois *(8)*, New Jersey, Michigan *(9)*, Iowa *(5)*, and Utah *(20-22)*. The methods used in conducting these experiments were varied but usually resulted in substantially increased yield. Irrigation was of three types, surface, sub-surface, and sprinkling.

With a shallow-rooted crop like onions, several irrigations would be indicated as essential. Mortensen and Hawthorne *(16)* did not measure the water applied but learned that sixteen irrigations produced fewer onions than six irrigations in 1931-32 and eight irrigations in 1932-33. In both years the plots received some rainfall. In tests comparing several vegetables, onions were frequently the crop giving the greatest increase in yield.

Curry *(2, 3)* in New Mexico, reported extensive irrigation tests on onions in irrigated plots. He found that the larger amounts of water did not affect seed stalk development and resulted in no significant change in the moisture content of bulbs. In fact, the heavier irrigation treatments produced a larger percentage of No. 1 bulbs, which stored better than the bulbs of the other treatments.

Platenius *(17)* described a method for determining the pungency of onions, based on the assumptions that onion oil has a definite composition and that differences in the pungency of onions are due to the different amounts of oil present and to the volatile sulfur content. The latter is mostly derived from allyl propyl disulfide. It is now clear that other compounds also contribute to the pungency of onions. Nevertheless, the volatile sulfur content is a suitable index to ascertain differences in pungency. A photometric modification of Platenius' method was described by Currier *(1)*. Platenius and Knott *(18, 19)* indicated that pungency increases with maturity and that the onions should be tested just as the tops fall over. Since onions are stored and used over a period of several months, it seems that they should maintain their pungency differences over the entire period.

Erwin and Haber *(5)* had noted in 1934 that irrigated onions were milder in pungency. Platenius and Knott *(19)* also called attention to the fact that soil moisture affected pungency. They grew three varieties of onions, irrigating one end of the field with a sprinkler. An inch of water was added each week for 17 weeks. They found that irrigation increased the size of bulbs considerably but decreased the sulfur content. Onions with no irrigation showed 22.2, 3.4, and 5.8 percent higher volatile sulfur content than the onions grown without irrigation. When grown in drums with differing water table, the onions having the lowest water table showed the greatest increase in sulfur content. Even if pungency was increased by a lack of irrigation, the resulting decrease in yields would make this an impractical farming procedure.

The paper by Kramer *(7)* gives a good review of plant soil moisture relationships.

Methods

The present studies were made at Davis, California, during the seasons of 1941-42 and 1942-43 on a sedimentary soil of Yolo loam. A preliminary trial in the spring of 1941 gave results similar to those described in this paper for the subsequent tests.

Seed of both early and late varieties, obtained from commercial sources, was planted in nurseries. The young onions were transplanted into field beds, two rows to a bed, on beds 40 inches apart. The plants were spaced 4 inches apart in the row.

The early varieties were seeded on September 10 in 1941 and on October 8 in 1942 and were transplanted to the beds on December 18, 1941 and December 29, 1942, respectively. Seeding dates for the late varieties were January 27, 1942 and October 20, 1942, with corresponding transplanting dates of March 26, 1942 and February 2, 1943. The onions harvested in 1942 were replicated three times, and those in 1943 four times. The rainfall for the two years was 21.2 inches in 1941-1942 and 17.8 inches in 1942-1943.

Four types of plots (A, B, C, and D) were each planted to three varieties of onions, 4 rows (1/270 acre) per variety. The A plots were unirrigated. The B plots received what was considered an ample amount of irrigation water. The C and D plots received successively lesser amounts of water. These

[a] Presented at the Ninth Annual Meeting of the I. F. T., San Francisco, California, July 13, 1949.

[b] Data on number of applications and inches of water applied in irrigation treatments have been supplied by L. D. Doneen of the Division of Irrigation.

onions, planted during the rainy season (November to April), were also able to use the soil moisture from rain. All plots to be irrigated received the same amount of water at each irrigation, usually less than 2 inches. Since C and D plots were irrigated less frequently than B plots, their total application of water was smaller.

The usual cultural care for onion production was given. This work was performed immediately after the start of World War II when the available labor supply was poor and unskilled. Some of the large experimental errors in 1942 can probably be attributed to this factor. When 15 to 25 percent of the onion tops had fallen over on several plots, the matured bulbs on all plots were harvested, dried, topped, and stored in onion crates. As they matured, the remaining onions on all plots were harvested at weekly intervals. The federal grades were used to determine the quality and were expressed in terms of No. 1 onions. Samples for storage trials, pungency, and drying ratio determinations were stored in the onion-bulb house, where temperatures are controlled by air ventilation. These conditions have given satisfactory storage over a period of years. The samples weighed each about 25 pounds in 1942 and nearly 40 pounds in 1943. The dry weight determinations were made at 70° C. (158° F.) in a draft oven. The drying ratios were determined by a commercial drier, as indicated in Table 4. Drying ratio refers to the pounds of raw onions required to produce a pound of dry onions. A drying ratio of 9.0 indicates that nine pounds of onions were needed to produce one pound of the dried produce; a figure of 12 indicates a smaller yield upon drying. Onion pungency was rated by the method of Platenius *(17)*.

Results and Discussion

As shown in Table 1, irrigation gave increased yields in all comparisons. These increases were proportional to the amount of water applied to the plants. The wet (B) and dry (A) treatments in 1942 were always significant, but only about one half of the comparisons showed important differences between the medium (C) and wet (B) treatments. With one minor exception, the 1943 results showed significant differences in yield between all treatments. The comparison between the wet (B) and the medium (C) treatments of the Grano onion was not significant. Differences between the medium (C) and light (D) irrigation treatments in 1943, however, were all significant. The increased yield of the C plots was due to one extra application of water (1.7 inches). The lower yields of early onions in 1943 may be partly explained by the smaller winter rainfall. The yields in Table 1 are No. 1 onions, representing about 88 percent of all those harvested. For the sake of brevity, the data have been omitted on California Early Red and Sweet Spanish, both of which were also grown each year. The increased yields reported from irrigation have been due to death of plants as well as to decreased size of bulb on nonirrigated plots. Though equal numbers of plants were set on each plot, a larger number of onions was usually harvested from the irrigated plots.

The effect of insufficient soil moisture upon the appearance of onions is of interest in detecting extreme cases of moisture deficiency. Plant growth was at a reduced rate on plots lacking sufficient soil moisture. The plants grown on the latter plots were a darker green at first but showed some drying and dying of leaf tips at advanced stages of moisture starvation. There was no wilting, although this has been observed in the greenhouse when the plants were growing in pots of small soil volume. Insufficient soil moisture was responsible for small bulb size, as is discussed later. Irrigation treatment did not seem to affect premature seeding appreciably, although there was some bolting on the early onions in 1943. The amount, however, was less than one-half of one percent.

The data in Table 2 illustrate the effect of irrigation on the size of bulb. In all cases the size was proportional to the amount of irrigation water applied. Most of these differences were significant.

TABLE 2

Effect of Irrigation on the Weight of No. 1 Bulbs

Treatment	Inches of water	Pounds per No. 1 bulb		Inches of water	Pounds per No. 1 bulb	
		Grano	Stockton Yellow Globe		Australian Brown	Southport White Globe
		1942				
A. Dry	0.0	0.32	0.32	0.0	0.11	0.16
B. Wet	11.2	0.56	0.64	18.9	0.21	0.25
C. Medium	6.6	0.49	0.55	10.6	0.17	0.21
L. S. D. odds 19:1		0.15	0.06		0.04	0.04
		1943				
A. Dry	0.0	0.18	0.12	0.0	0.11	0.14
B. Wet	13.1	0.34	0.21	27.3	0.23	0.31
C. Medium	5.3	0.31	0.18	14.1	0.21	0.27
D. Light	3.6	0.26	0.13	9.0	0.15	0.17
L. S. D. odds 19:1		0.05	0.04		0.06	0.04

Onions from each plot were graded according to U. S. grades. In most cases the onions from the different plots were quite similar in grade. Sometimes the nonirrigated (A) plots were higher in percentage of No. 1's, but more frequently the irrigated plots gave the higher percentage. While some of these differences were significant, the smaller size of the nonirrigated onions was a handicap in any such comparison. Irrigation seemed to have little real effect on the grade of

TABLE 1

Effect of Irrigation on the Yield of Onions

Treatment	Inches of water	Number of irrigations	50-pound sacks of No. 1's per acre		Inches of water	Number of irrigations	50-pound sacks of No. 1's per acre	
			Grano	Stockton Yellow Globe			Australian Brown	Southport White Globe
			1942					
A. Dry	0.0	0	426	419	0.0	0	102	102
B. Wet	11.2	6	653	855	18.9	9	297	287
C. Medium	6.6	3	620	719	10.6	4	236	214
L. S. D. odds 19:1			171	23			72	34
			1943					
A. Dry	0.0	0	203	101	0.0	0	71	130
B. Wet	13.1	8	476	272	27.3	11	335	453
C. Medium	5.3	3	438	235	14.1	4	248	369
D. Light	3.6	2	313	137	9.0	3	175	221
L. S. D. odds 19:1			51	6			56	74

onions. These data have been reported in detail in a mimeographed publication by MacGillivray and Doneen *(13)*.

Bulbs matured earlier (Table 3) and were smaller in size as a result of insufficient soil moisture. Some of the variations shown in the table were due to the harvest of the three varieties at one time. The data could have been obtained more accurately if this point had been considered earlier. In all cases the non-irrigated

TABLE 3

Percentage of Bulbs Mature at First Harvest (Figures are averages for three varieties)

Treatment	Early Varieties		Late Varieties	
	1942	1943	1942	1943
	percent	*percent*	*percent*	*percent*
A. Dry	27.8	28.4	40.9	19.8
D. Light	.....	13.5	.....	6.1
C. Medium	10.5	21.1	23.9	5.0
B. Wet	7.0	12.2	16.3	4.1

treatment gave the greatest percentage of early bulbs. In all except one case the wet treatment produced the smallest percentage of early yield. This response can probably be explained by a cessation of growth due to a lack of available water which causes the bulb to mature.

Samples of No. 1 onions were placed in common storage for about three months to determine whether irrigation affected storage life. The early varieties suffered considerably more loss than the late ones from the two primary causes, sprouting and rotting. The nonirrigated (A) onions (with the exception of Australia Browns in 1942) showed the greatest loss in weight during this period. The reason is not known for the differences in keeping qualities of those receiving the several irrigation treatments, but very likely rest period may have been a factor. Since nonirrigated onions matured earlier, it seems probable that their rest period was also over earlier, thus resulting in more sprouting. Though this factor helps to explain some of the differences found, other conditions may also have been responsible, since the weight of sprouted onions was not determined.

Dry Matter and Pungency

Onions produced in both 1941 and 1942 were analyzed for pungency, but dry matter determinations were confined to the 1942 harvests. The 1942 data are found in Table 4. Since there is a close relationship between percentage of dry matter and drying ratio, the two will be considered together. Irrigation treatment seemed to affect the percentage of dry matter in early onions only, though the differences were not large. In five comparisons the nonirrigated treatment required the smallest weight of onion bulbs to produce a pound of dried onions. Since irrigation greatly increases yield, a grower can scarcely afford to raise nonirrigated onions unless the price per sack is higher. Because of the greater acre yields, irrigation likewise will result in the production of a greater amount of dried onions per acre.

Irrigation treatment did not greatly affect the sulfur content, as was indicated by the index of pungency obtained according to the method of Platenius *(17)*. In most cases, the onions from the nonirrigated plots

TABLE 4

Effect of Irrigation on Dry Matter, Pungency, and Drying Ratio of Onions (1942)

Treatment	Early Varieties			Late Varieties		
	Dry matter, percent	Pungency (volatile sulfur) p.p.m.	Drying ratio [b]	Dry matter, percent	Pungency (volatile sulfur) p.p.m.	Drying ratio [b]
	Early Grano			Southport White Globe		
A. Dry	7.7	51	12.7	10.2	161	9.2
B. Wet	6.8	64	13.3	11.1	180	8.1
C. Medium	6.6	56	13.3	11.1	186	9.2
	Stockton Yellow Globe			Sweet Spanish		
A. Dry	8.6	67	10.6	7.6	93	10.4
B. Wet	8.4	77	11.0	7.9	101	11.0
C. Medium	8.3	81	11.7	8.0	102	10.9
	California Early Red			Australian Brown		
A. Dry	10.2	73	9.7	13.0	169	7.6
B. Wet	9.3	76	10.5	13.1	184	7.9
C. Medium	9.6	73	10.4	12.7	185	7.9

[b] Pounds of cured onions required to produce one pound of dried onions. The determinations were made by the Basic Vegetable Products Co. of Vacaville, California.

possessed the least pungency. Similar data were obtained on the 1941 crop. Of the three varieties tested in 1941, only Sweet Spanish had a greater sulfur content in the nonirrigated onions. The data of Platenius and Knott *(19)*, on the other hand, indicated that low soil moisture increased the pungency of onions. In our trials irrigation increased the total amount of volatile sulphur produced per acre, but did not greatly affect the percentage composition of the onions as to pungency.

Summary

In a semi-arid area, where the winter rainfall averages 17 inches, irrigation markedly affected the growth of onions. The yield and size of bulb was increased by irrigation. Insufficient soil moisture caused earlier maturity. Grade, storage life, dry matter, drying ratio, and pungency were not greatly influenced by irrigation. This response in onions is explained by the shallow root system of the crop.

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Improved Methods for Evaluating Starch for Specific Uses[a]

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Procedures for the evaluation of starches intended for specific industrial processes are outlined. These procedures are based upon the flow characteristics of slurries of ungelatinized starch, changes which take place in the viscosity and microscopic appearance of starch slurries during a heating cycle, and the susceptibility of starches to amylase action at relatively low temperatures. The interpretation of these measurements and observations, as applied to starches intended for specific uses, is discussed.

The importance of starch in the food processing industry is recognized when it is realized that of all types of food materials processed starch in its many forms is the most widely used. Although starch enjoys this very prominent position, little is known about the accurate objective evaluation of starch in terms significant to the processing industry. Too often starch specifications in the conventional terms of chemical analysis, gelatinizing temperature, and Scott viscosity have no relationship to use characteristics. The tests and observations discussed in this paper have been found to be related to processing characteristics during use and to finished product quality when dealing with researches on corn starch puddings, tapioca puddings, quick-cooking rice, cereals and some other related food products.

In our researches we have found that the use characteristics of the starch and finished product quality are most closely related to water absorption, swelling, rupture, viscosity and finally gel formation. With the exception of the last, gel formation, which will not be discussed in the present paper, all of the changes deal with the phenomena broadly known as starch gelatinization.

[a] Presented at the Tenth Annual Meeting of the I. F. T., Chicago, Illinois, May 23, 1950.

Cold Slurry Flow-Time

The chemical and heat treatment which starch receives during the starch production operations has a marked effect on the characteristics of the starch. One manifestation of heat treatment during drying resulting in a slight gelatinization is an increased ability of the starch to absorb or hold water. The determination of the flow-time of a starch-water slurry under specific conditions is a measure of the absorption.

Test Procedure [b]

A starch of known moisture content is mixed in a 600 ml. glass beaker with water at 85° F. (29.4° C.) in the proportions required to attain the desired concentration in the slurry. The mixture is agitated for five minutes by means of a stainless steel, propeller type agitator driven at 30 r.p.m. The slurry is transferred to a standard funnel (Figure 1) up to a height 5 mm. from the top of the funnel. The time required for 100 ml. to flow into a 100 ml. graduate is measured with a stopwatch.

[b] This method is a modification of a test procedure employed by the Hubinger Co., Keokuk, Iowa and recommended to us for starch evaluation.

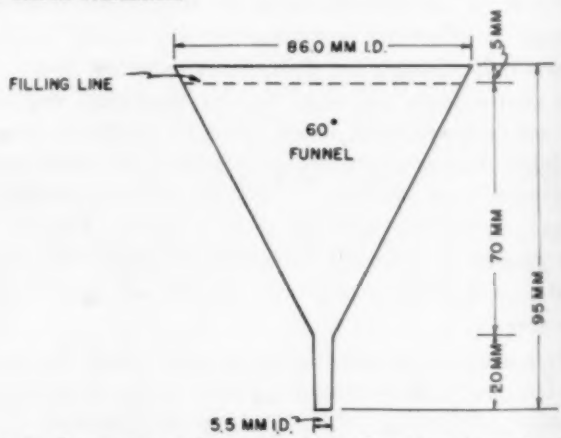

FIG. 1. Apparatus used for cold slurry flow time determination.

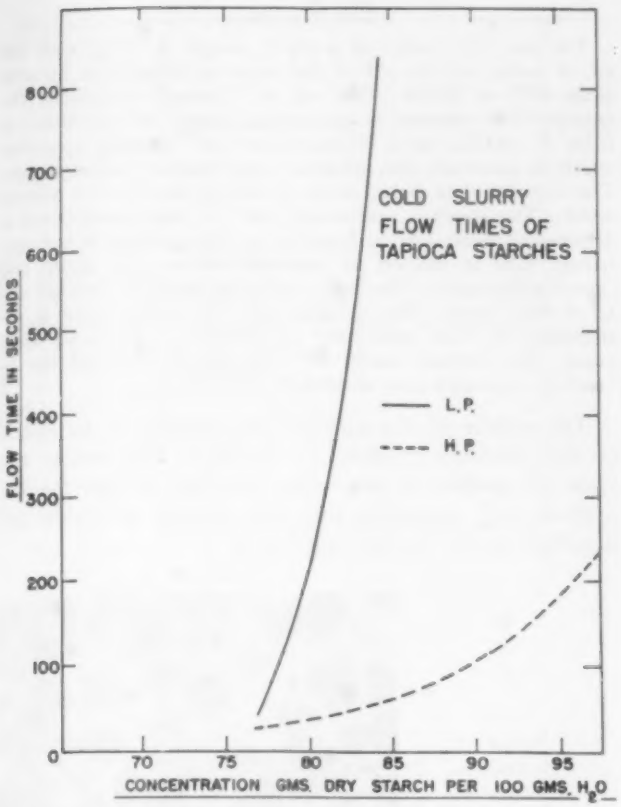

FIG. 2. Viscosity curves for Brazilian tapioca starch.

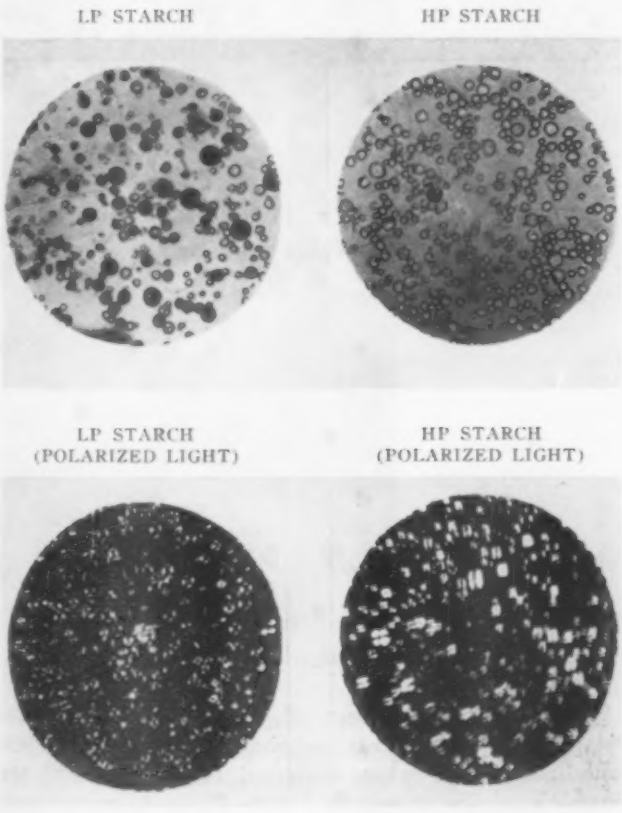

FIG. 3. Photomicrographs of starches used for cold slurry flow time.

By determining the flow-time at different starch concentrations, a curve is obtained which is characteristic of the starch sample. Such curves are given for two samples of Brazilian tapioca starch in Figure 2. Photomicrographs (Figure 3) of these two starches reveal that sample LP contains more slightly swollen starch granules than sample HP. This sample also contained more starch granules which, under polarized light, showed a faded Maltese cross or no Maltese cross. The small amount of swollen starch is probably responsible for the greater absorption of water by the starch, resulting in a marked increase in the flow-time of the starch slurry. This water absorption characteristic is important in many processes involving the pumping or manipulation of heavy slurries of starch in water at temperatures below that of gelatinization or prior to gelatinization. The absorption of water is important in those processes in which gelatinization takes place in the presence of a limited amount of water. Under these conditions non-uniform absorption of moisture results in non-uniform gelatinization, since the gelatinization temperature of starch is a function of the amount of moisture available.

Viscosity Change During Heating

The viscosity of a starch suspension changes upon heating due to the swelling, rupture and dispersion of the starch. Although the information obtained is similar in many respects, we prefer the Brabender amylograph instrument to the Corn Industries Research Foundation's instrument for control operations as well as for our research activities. The data discussed in this paper are consequently limited to those obtained on the Brabender instrument.

Test Procedure for Tapioca Starch *

To a twenty-seven gram starch sample (dry weight basis) is added sufficient distilled water to bring the total weight to 477 gm. After mixing, the starch suspension is poured into the cup of the Brabender amylograph. The starch suspension is heated from 95 to 194° F. (35 to 90° C.) at a constant rate of 2.7° F. (1.5° C.) per minute. The temperature of 194° F. (90° C.) is maintained for 15 minutes. The starch slurry is then cooled at a constant rate of 2.7° F. (1.5° C.) per minute.

The marked viscosity changes taking place during the heating of the starch suspension are brought about mostly by physical modifications in the starch granule. These changes and consequently the viscosity changes differ with different starches. Figure 4 shows the amylograms for two samples of Brazilian tapioca starch.

The changes taking place during the heating of the starch slurry in the Brabender amylograph instrument are best explained by a study of photomicrographs of the starch suspension.

Changes in Microscopic Appearance

The first photomicrograph (Figure 5) shows little or no visual change in the starch granule prior to the rapid increase in viscosity of the HP and LP starches. A comparison of the photomicrographs taken during

* If this procedure is used for other types of starch it will be necessary to use a different starch sample weight.

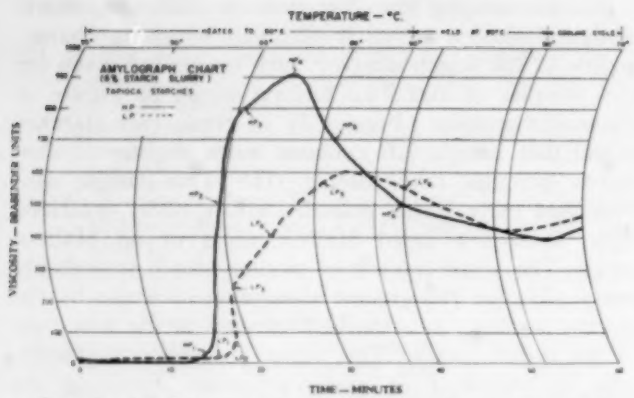

FIG. 4. Amylograms of two samples of Brazilian tapioca starches.

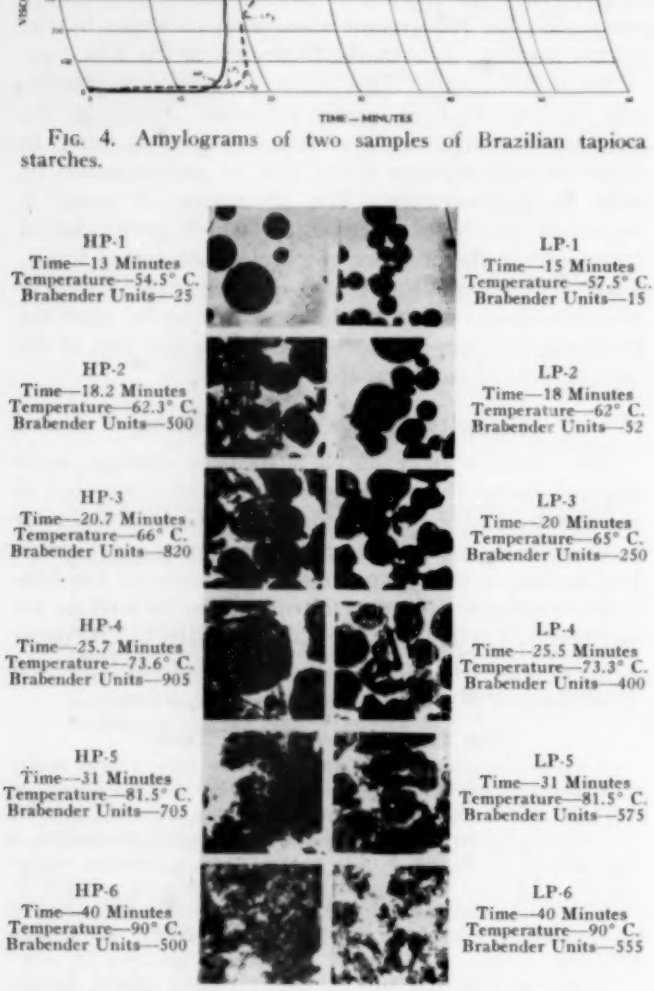

FIG. 5. Photomicrographs of amylograph samples.

the swelling of the granule suggests a mechanical explanation for the rapid increase of viscosity. The rapid swelling of the starch granule alters the flow characteristics due to the congestion of the distended granules. As the starch granules rupture and the starch is dispersed, the viscosity drops.

Amylase Susceptibility

It is well known that the degree of gelatinization and starch granule damage has a marked effect on the rate of amylase action. In our work we have found that an empirical procedure using Clarase (a product manufactured by Takamine Laboratories) exhibits a marked difference in rate of liquefaction of heat modified granules and of unaltered starch granules. A study of the variables involved established the following preferred conditions for conducting the test.

Test Procedure

Ten gm. (dry basis) of a starch sample is mixed with 200 ml. of water, and the pH of the slurry is adjusted to 5.6 with dilute HCl or NaOH. Fifty mg. of "Clarase" is added to the mixture. The mixture is then stirred slowly for two hours at 107.6° F. (42°C.) in a "Weber-Ehrenfield" mashing apparatus which is provided with stainless steel beakers and agitators. The slurry is then placed in an ice bath to slow up the enzyme action. The slurry is centrifuged, and the supernatant liquid is decanted through a tared filter paper. The residue in the centrifuge tube is washed by resuspending in cold water and centrifuging again. The wash water is decanted through the tared filter paper. The residue in the centrifuge tube is resuspended in cold water and transferred to the tared filter paper. The residual starch and filter paper are dried for 16 hours in a vacuum oven at 158° F. (70° C.).

The course of the amylase liquefaction is indicated by the photomicrographs in Figure 6. By noting the ratio of swollen to unswollen granules during the digestion, it is apparent that the swollen granules are liquefied by the amylase digestion.

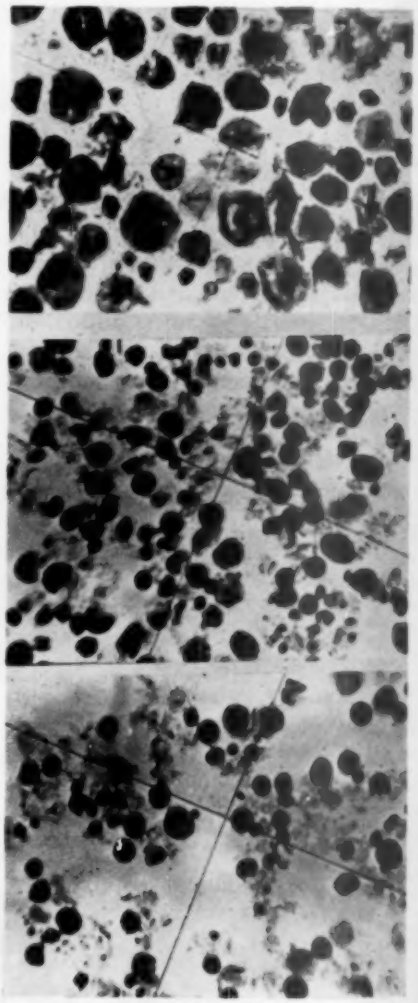

FIG. 6. Photomicrographs showing rate of amylase digestion.

The rate and extent of liquefaction of tapioca starches containing various amounts of raw and heat modified starch, when subjected to the standard test conditions, are shown in Figure 7. It is to be noted that in all cases studied the extent of liquefaction levels off rapidly. A digestion period of two hours is well

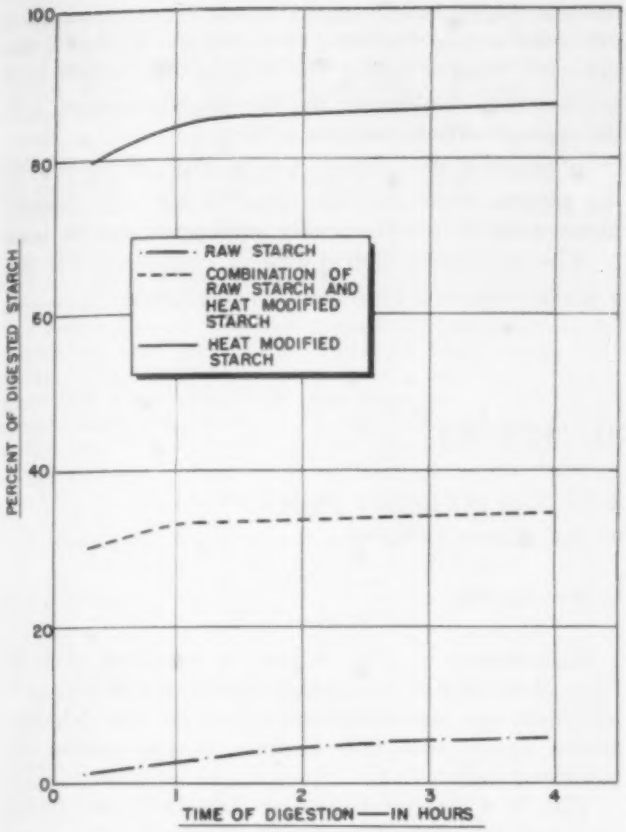

FIG. 7. Amylase susceptibility of tapioca starches.

within the plateau region. By making due allowance for the extent to which the raw starch is liquefied, it is possible to interpret the degree of liquefaction obtained in the standard test in terms of percent raw starch. The measurements are readily reproducible. The correlations which have been established between these analyses and the use characteristics of the various starches have been of great value. This is particularly true since photomicrographs are very difficult to evalute in quantitative terms.

The degrees of amylase susceptibilities of samples of tapioca starch taken during a Brabender amylogram are tabulated in Table 1.

TABLE 1

Degree of Amylase Susceptibility of Amylogram Samples

Amylograph Curve Position	Raw Starch, Percent
LP-1	15.3
LP-2	3.0
LP-3	3.0
LP-4	6.0
HP-1	20.6
HP-2	2.7
HP-3	1.8
HP-4	1.2

Interpretation of Data

The microscopic observations and the enzyme susceptibility, combined with controlled plant experiments, form the sound basis for the interpretation of Brabender amylograms. The temperature at which the rapid swelling commences is clearly observed by the rapid rise of the curve. The minimum temperature at which rapid swelling starts is important in the control of many processes. The extent and rate of swelling of the starch are indicated by the height of the viscosity peak and the time necessary to reach it. This maximum or peak can be narrow and very sharp or broad, depending upon the rate of swelling and resistance of the starch granule to rupture. A starch giving a sharp, narrow viscosity maximum will require very close control of the heat treatment if a uniformly swollen starch granule is desired in the food processing. Conversely, a starch giving a broad viscosity maximum or plateau will not require as critical processing control in order to obtain uniformly swollen starch granules and consequently uniform product quality. To generalize, if minor processing variables are unavoidable and if uniform swelling is desired then (other things being equal) a starch giving a broad maximum viscosity or plateau will be most satisfactory.

The resistance of the swollen granule to full distention and rupture is reflected in the portion of the curve during which the starch is held at a high temperature. Resistance to "cooking out" or rapid loss of viscosity on further heat treatment, such as during the recipe use as a pudding or as a pie thickener, is often an important characteristic. The holding and cooling portions of the amylogram cycle are often related to such qualities.

It is believed that the procedures given will serve best if they are accepted as general procedures and are adapted to the particular case with respect to time and temperature relationships.

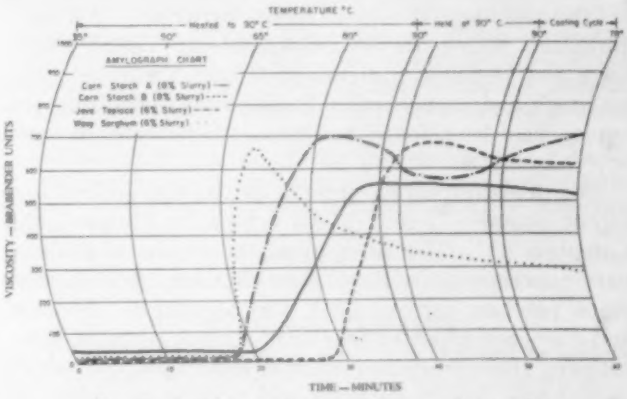

FIG. 8. Amylograms of various starch samples.

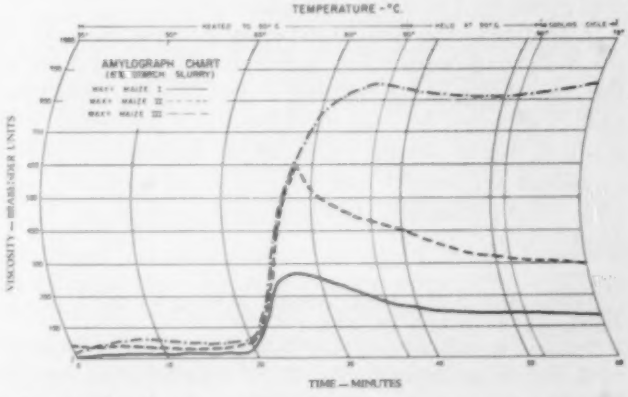

FIG. 9. Amylograms of three samples of waxy maize starch.

Typical Brabender Amylogram Curves

Typical curves representative of some of the variations to be encountered with corn, waxy sorghum, Java tapioca, and waxy maize are given in Figure 8 and Figure 9. Detailed interpretation according to the criteria noted above will bring out many differences and valuable conclusions.

Summary

Procedures for the evaluation of some starch characteristics related to processing in use and finished product quality have been developed. These procedures are based on the flow-time of a cold starch slurry, the viscosity changes during the heating of a starch suspension, the changes in microscopic appearance, and the susceptibility to amylase activity.

By adapting the heating, holding and cooling cyle to the process under investigation, the viscosity changes as recorded by the Brabender amylogram can be used to forecast, with a high degree of confidence, the use characteristics and finished product quality.

Dehydrofrozen Apples[a]

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Dehydrofreezing, a new food processing technique combining the advantages of dehydration and freezing, has been satisfactorily applied to many of the leading Western apple varieties. Details on enzyme inactivation, drying temperatures, reduction of weight and volume, effects of variety and maturity, packaging, and their advantages and adaptability to bakery and institutional uses are given.

Dehydrofreezing, a new food processing technique combining the advantages of dehydration and freezing, has been satisfactorily applied on a small scale to many of the leading Western apple varieties. Winesap, Jonathan, Rome Beauty, Gravenstein, Yellow Newtown and Delicious varieties have been processed. For pie stock and certain other baking uses, dehydrofrozen apples have been found to be essentially equal to fresh apples.

The dehydrofreezing process has been described in a recent patent *(1)* and in an article by Howard and Campbell *(2)*. The latter gives the results of preliminary experiments on Royal Ann cherries, apricots, freestone peaches, carrots, peas, and asparagus. Howard and Campbell reported that each of these could be satisfactorily dehydrofrozen except asparagus, in which undesirable change in color and texture occurred. A detailed account of the research on dehydrofrozen peas was given by Talburt and Legault *(3)*.

Essentially, the dehydrofreezing process consists of the following steps: (a) conventional preparation of the commodity as for canning or freezing, (b) inactivation of enzymes by heat or chemicals if necessary, (c) a short, rapid drying cycle in an atmospheric drier to reduce the weight and volume by at least one-half, and (d) packaging, freezing and storing at 0° F. (—18° C.).

Such factors as high degree of retention of fresh apple characteristics, decreased transportation and storage costs, and ease of utilization indicate that dehydrofrozen apples will find a place in the market for processed apples.

This is a general paper on dehydrofrozen apples, covering the overall processing methods developed, properties, quality and uses of the finished product. Other more specific and detailed papers on enzyme inactivation and varietal effects, drying conditions, and economics of dehydrofrozen apples are to be published soon.

Preparation

The apples are peeled, cored and sliced in conventional radial sections or wedges. Since the processing operation was set up batchwise in order to adapt it to available equipment, it was necessary to accumulate the prepared slices in a 1 percent salt solution until a drier load (about 40 pounds) was ready. Continuous operation, possible with other types of driers, would eliminate need for the salt-water bath.

Radial sections are not considered the ideal shape or size for dehydrofreezing, because the use of smaller pieces, such as segments of transverse slices or rings, reduces problems incident to enzyme inactivation, shortens drying time, and hastens reconstitution. However, most of the research has been conducted on the conventional radial slices, since they are so commonly used.

Enzyme Inactivation

Apples, unlike many other fruits, contain sufficient air in the intercellular spaces to cause internal darkening when prepared slices are frozen and thawed or when they are slowly heated above 120° F. (48.9° C.). Since both of these treatments occur when apples are dehydrofrozen, it is necessary that oxidative enzymes in the center of the apple slice be inactivated as well as those on or near the surface.

The two usual methods of enzyme inactivation (by heat or chemicals) have been investigated. Results so far indicate that

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[a] Presented at the Tenth Annual Meeting of the I. F. T., Chicago, Illinois, May 24, 1950.

[b] Bureau of Agricultural and Industrial Chemistry, Agricultural Research Administration, U. S. Department of Agriculture.

if small amounts of sulfur dioxide (25-50 p.p.m.) are not objectionable in the final product, sulfurous acid and its salts are superior to other chemicals and to heat as means of preventing darkening. This procedure gives a better colored product and avoids leaching losses incidental to steam or water blanching. Salt, citric acid, ascorbic acid, and combinations of these have not given adequate protection from darkening during the subsequent steps of dehydrating and freezing.

Sulfites and sulfur dioxide are applied by immersing the apple slices in an aqueous solution of the desired compound. The minimum contact time and concentration which will prevent subsequent darkening are used, so as to avoid excessive amounts of sulfur dioxide in the final product. It has been found that these minimum immersion times and concentrations vary considerably with apple variety and to a lesser extent with maturity. The temperature of the dipping bath is not critical within the temperature range that might be encountered in normal operations, 60-90° F. (15.6-32.2° C.). Minimum concentrations and immersion times for several lots of apples are shown in Table 1. Examination of this table shows that sulfurous acid penetrates apple tissue much more rapidly than sodium bisulfite (acidified to pH 3 with citric acid). Thus by the use of sulfurous acid instead of acidified sodium bisulfite solution in the dipping bath, it is possible to reduce the immersion time from 20 to only 3 minutes without increasing the concentration of the solute. The use of sulfurous acid, with resulting shorter immersion times, is recommended for Winesap, Yellow Newtown, and Delicious varieties, in order to minimize leaching losses in the dipping process. Certain soft varieties, such as Gravenstein and Jonathan, have been so permeable to sulfur dioxide that short immersion times were possible with acidified bisulfite solutions.

TABLE 1

Minimum Sulfur Dioxide Concentrations and Times Required for Enzyme Inactivation in Processing Apple Slices for Dehydrofreezing

Variety	$NaHSO_3$ (adjusted to pH 3 with citric acid)		H_2SO_3	
	Concentration (as percent SO_2)	Dip time (minutes)	Concentration (as percent SO_2)	Dip time (minutes)
Pippin	0.4	20	0.4	3
Delicious	0.4	20	0.6	2
Gravenstein	....	....	0.2	3
Gravenstein	....	....	0.4	0.75
Jonathan	0.4	2	....	....
Winesap	....	....	0.6	2.5

In all laboratory operations it was found possible to set the immersion time at three minutes and vary the concentration of the sulfurous acid in the dipping bath so as to obtain the minimum treatment for preventing darkening. Concentrations of sulfur dioxide in the dipping bath in excess of 0.6 percent (6,000 p.p.m.) should be avoided owing to the high partial pressure of sulfur dioxide. This results in excessive losses of sulfur dioxide from the solution and noxious fumes around the bath.

For certain uses, as in baby foods or in remanufacture, where canning is involved, small quantities of sulfur dioxide in dehydrofrozen apples may not be permissible. In such cases enzymes may be inactivated by conventional steam or water blanching procedures.

Apple slices, after treatment for enzyme inactivation, go directly from the blancher or sulfiter to the drier. No holding period is necessary to allow penetration of sulfur dioxide and if heat is used to inactivate enzymes, the hot slices may go directly to the drier without cooling.

Drying

The slices, blanched or treated with sulfur dioxide to prevent enzymatic darkening, are partially dehydrated in an atmospheric drier. Drying conditions are not critical for blanched apples as long as excessive temperatures, which may cause heat damage, are not used; 220° F. (104.4° C.) can be safely used where extent of dehydration does not exceed 50 percent of original weight. However, in drying slices treated with sulfur dioxide, conditions must be carefully controlled, since the final sulfur dioxide content, which should be kept near its threshold value, is determined to a large extent by the wet and dry bulb temperatures used in drying. In addition, as mentioned in the previous section, sulfur dioxide must penetrate to the center of the slice before the piece temperature rises above 120° F. (48.9° C.); otherwise center darkening will occur.

Drying conditions are controlled so that sulfur dioxide rapidly penetrates the apple tissue in the initial stages of drying and is almost entirely dissipated from the slices by the time the short drying cycle (30-60 minutes) is complete. Generally high humidities and high wet-bulb temperatures result in rapid sulfur dioxide penetration and low residual sulfur dioxide; low humidities and low wet bulb temperatures result in slower penetration and higher residual sulfur dioxide in the partially dried slices. By properly controlling drying conditions 200° F. (93.3° C.) dry bulb and 150° F.(65.6° C.) wet bulb temperatures the sulfur dioxide content in apple slices can be reduced from an initial value of 300-500 p.p.m. to 20-40 p.p.m. (fresh slice basis) in the final product. This amount of sulfur dioxide permanently protects the dehydrofrozen apples from subsequent darkening.

Cabinet and tunnel-type driers using cross-flow air with velocities from 500 to 900 linear feet per minute have been successfully used in the partial dehydration step. Dry and wet bulb temperatures as high as 220° F. (104.4° C.) and 170° F. (76.7° C.), respectively, can be used without harming the product where dehydration is not in excess of that required to reduce the weight by one-half. The drying rate is rapid and almost linear up to this point. Further dehydration proceeds at a progressively slower rate and must be carried out at lower temperatures in order to avoid heat damage.

Where tray drying is used, tray loadings should not exceed 1.5 to 2 pounds per square foot in order to obtain more uniform drying. Uniformity of drying is considered to be important though not highly critical. Continuous multiple-belt driers and certain types of rotary driers should be suitable for this operation and should reduce labor costs considerably.

Freezing and Packaging

Freezing and packaging costs are reduced considerably by dehydrofreezing. In the previous dehydration step, where the weight of the fresh slices is reduced by one-half, considerably more than one half of the water present is removed. Power costs and required refrigeration capacity would be reduced considerably by the smaller amount of water to be frozen in this type of product as compared with conventional frozen apples.

Savings in packaging costs may be accomplished in two ways: 1. By packing a greater weight of apples (fresh slice basis) into a container of a given size than is possible without dehydration, and 2. By the use of lower-cost containers since no liquid drains from the slices even after freezing and thawing. The partially dehydrated slices can be packaged before or after freezing. For maximum economy (to pack the greatest weight into a given container) packaging should precede freezing, since the unfrozen slices are soft and

pliable and pack closely into the container. In this state, it has been found that 50-60 pounds (fresh slice basis) of apples can be packed into a 30-pound can. When frozen before packaging, about 25 percent fewer apples can be packed into this size of container. The latter method of packaging, though more expensive, may be desirable for certain uses where individually frozen pieces are required.

The Product

Dehydrofrozen apples, dried to 50 percent weight reduction, are reduced in size also by one-half, without appreciable change in the general appearance of the slices. These are quite attractive and are not shriveled or misshapen and do not have a dried-apple appearance. They are permanently protected against darkening and contain 20 to 40 p.p.m. sulfur dioxide (fresh weight basis). They can be thawed and held at 75° F. (23.9° C.) for several days without untoward effects and can be held for a week or longer at 32° F. (0° C.).

The thawing period is much shorter than that for conventional frozen foods. A 30-pound can will thaw in a few hours to the point where the slices separate freely. Absence of leakage from the thawed slices is a considerable advantage to the baker. In reconstituting for pie filling, a short soaking period of about one hour is sufficient for most uses. A direct cook, with all filling ingredients, of less than five minutes may also be used.

The permissible extent of dehydration is rather difficult to determine and may vary for different final uses. Dehydration in excess of 50 percent weight reduction (up to 60-65 percent) does not particularly change the organoleptic or rehydration characteristics of the resulting product. However, as dehydration proceeds beyond that required to reduce weight by 50 percent, the slices become progressively more collapsed and wrinkled. This may make the product less desirable for some uses.

Varieties that are excessively soft or lack in acid may be dehydrofrozen with calcium salts or rehydrated with acidulated water in order to correct these defects.

Utilization

Utilization of dehydrofrozen apples, at least initially, is likely to be confined to institutions such as bakeries and restaurants. Considerable work has been done to evaluate use as pie stock for both wholesale and retail bakeries. Results of these bakery trials showed dehydrofrozen apples to be quite satisfactory for large or small operations, and readily adaptable, with only minor changes in procedure, to any of the commercial methods employing either fresh, frozen, or canned apples. No additional equipment is required.

The flavor and texture of dehydrofrozen apples, evaluated in pie, are considered similar to those of fresh apples. For at least a few months out of the year dehydrofrozen apples are superior to slices from long-storage, fresh apple in both texture and flavor.

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Relationships Between the Amount and Composition of Press Fluid, Palatability, and Other Factors of Meat

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No relationship was found in beef between percentage of press fluids and scores for quantity of juice. There was a direct curvilinear relationship between percentage of fat in press fluid and scores for quantity and quality of juice. Percentage of press fluid tended to decrease with increase in its fat content. Consistent relationships between these factors were not found in lamb, mutton, and chevon.

[a] Presented at the Tenth Annual Meeting of the I. F. T., Chicago, Illinois, May 24, 1950.

[b] The authors wish to give credit to H. Slofsky who determined the correlation coefficients, R. Berg, H. Tucker, and R. Bechtold for assistance in certain phases of the chemical work and to W. Kauffman who determined the fat content of the press cakes, total edible portion of the ribs, and the rib eye muscles.

Introduction

Quality and quantity of juice are among the most important properties that contribute to the palatability of meat. The limitations of the subjective method of determining these palatability factors are well recognized and have been adequately described. Objective methods are needed in meat research, but progress in that direction has been slow because of the extreme complexity of the juiciness factors.

In connection with breeding, nutrition, and meat investigations in the U. S. Bureau of Animal Industry at Beltsville, Md., carcasses of animals are examined for physical, chemical, and palatability characteristics. This report deals with relationships between palata-

bility factors of juiciness, amount and fat content of press fluid, age, breed, carcass grade, and intramuscular fat of beef, lamb, and mutton.

Review of Literature

Amount of juice has been defined by the Committee on Preparation Factors *(7)* as the relative quantity of juice judged in the act of chewing, or measured by mechanical means. Several accurate mechanical expression methods have been proposed and employed. However, relationships with scores for quantity of juice have been inconsistent. On the whole, subjective juiciness and the amount of press fluid do not appear to represent quite the same thing.

Using the pressometer devised by Child and Baldelli *(5)* at 250 p.s.i.g., Smith *(15)*, Satorius and Child *(14)*, and Hardy and Noble *(9)* reported correlations of 0.1, 0.31 (not significant), and 0.32 to 0.51 (highly significant), respectively, between scores for quantity of juice and the amount of expressible juice. Clark and Weatherby *(6)* used a hydraulic press at 10,000 p.s.i.g. at different temperatures and found no significant correlation. Using the same type of press, Tannor, Clark, and Hankins *(16)* found a correlation of 0.60 when a pressure of 9,800 pounds at 50° C. (122° F.) was used. Furthermore, when results from meat at different stages of doneness were compared, a correlation coefficient of 0.9 was found. Hall and coworkers *(8)* subjected ground raw and cooked meat to 4,000 p.si.g., and found no relation between press fluid and palatability. However, Wanderstock and Miller *(17)*, using the same pressure on raw beef rib eye muscle, found that in general the more finish a carcass carried the smaller was the amount of press fluid.

Quality of juice has been defined by the Committee on Preparation Factors *(7)* as the relative degree of richness and smoothness of the meat juices and is believed to depend on the concentration in the juice of meat solids, including fat. Many workers including Smith *(15)* and Satorius and Child *(14)* have found a close direct relationship between quantity and quality of juice. The latter workers found a correlation of +0.8. It is perhaps significant that in this work they found no important correlation between score for quantity of juice and press fluid. Therefore, it is possible that palatability factors of juiciness are influenced not so much by amount of juice as by its composition.

There is a general belief that high finish in an animal improves the quality and palatability of its meat. Branaman, Hankins, and Alexander *(3)* reported that quality and quantity of juice show a progressive increase in meat with an increase in intra-muscular fat. Hayes *(10)* found highly significant differences, due to carcass grade of beef, in quality and quantity of juice as well as the other palatability factors. Barbella, Tannor, and Johnson *(2)* after evaluating data from 728 cattle of different breeds and ages concluded that there was a significant direct relationship between age, ether extract of 9-10-11 rib cut, and scores for quality and quantity of juice. Scores for quantity of juice increased rapidly with increase in fatness to 22.5 percent and more slowly to 42.5 percent after which there was no apparent effect.

Wanderstock and Miller *(17)* found that beef with a higher finish scored higher in quality and quantity of juice. Maw *(12)* expressed the opinion that the degree of internal fat laid down in poultry determines the quality and moistness of the flesh.

In mature animals there is little variation in the chemical composition of muscle tissue of cattle, hogs, and sheep on a fat-free basis. However, Moulton *(13)* has shown that the protein-moisture ratio decreases as an animal approaches maturity, and Chatfield *(4)* and Hoagland and Powick *(11)* gave evidence that this ratio also decreases with increase in degree of fatness. Although small decreases in the amount of moisture per unit of protein appear to occur on fattening, the chief change which takes place involves a dilution of the moisture and protein of the lean by the addition of fat, weight for weight.

Apparently change in amount of protein is not of much significance. Hall and co-workers *(8)* pointed out the remarkable constancy of the sum of the amount of fat and moisture found in the rib eye of cattle of the same age which had a considerable variation in fat content. In view of these facts, the main change when an animal is fattened is the replacement of moisture with fat. Therefore, in meats cooked to the same state of rareness the potential amount of fluid would be expected to be about the same regardless of difference in fat content. However, it seems reasonable to suppose that the fat would be more difficult to remove than the moisture it has replaced. Moreover, the presence of intra-muscular fat might be expected to hold back some of the moisture that would otherwise be pressed out as juice. Accordingly, a cut of high intra-muscular fat content should tend to yield less press fluid than one of low fat content.

Experimental Procedure

The investigation involved 50 dual-purpose and 47 beef-type Shorthorn steers; 61 crossbred lambs, 27 purebred lambs of various breeds; 27 mature Karakul sheep, and 11 goats of Toggenburg and mixed breeding. All animals were fed a well-balanced ration. The steers were slaughtered at approximately 500 or 900 pounds, and the sheep and goats at various ages, weights, and degrees of fatness. In the group of purebred lambs, paired left and right legs of each animal were studied; while for the other lambs, mutton, and the goats only one leg from each animal was examined.

After storage at 38° F. (3.33° C.) for 10 days, left 9-10-11 rib cuts of the steers, and lamb, mutton and chevon legs were roasted in a ventilated electric oven at 302° F. (149° C.) to an internal temperature of 140° F. (60° C.) for beef and 156° F. (69° C.) for sheep. Sampling and palatability scoring on a 1-7 point scale were performed according to the method developed by the cooking committee of the Cooperative Meat Investigations project *(1)*. Juice was expressed at 9,800 p.s.i.g. at 50° C. (122° F.) according to the method of Tannor et al. *(16)*. After expression, the collected juice was extracted three times with petroleum ether in a mojonnier flask. The solvent was removed from the combined extract on the steam bath with a jet of nitrogen gas. The fat residue was dried to constant weight at 98° F. (36.7° C.) in a vacuum oven. Percentage of fat in the press fluid was calculated on the basis of the loss in weight of the meat samples rather than on the weight of the collected press fluid. In some cases the press cake was analyzed for fat. The raw right 9-10-11 rib cuts of the steers were analyzed for percentage of fat of the total edible portion and rib eye muscle.

RESULTS

Press Fluid

The Tannor et al. *(16)* method of pressing meat gives accurate press-fluid percentages, but it is not adapted to the quantitative collection of press fluid. Losses averaged about three grams, of which about one gram was caused by evaporation. Owing to differences in the size of sample and amount of press fluid therefrom, the percentage loss of press fluid varied considerably. This is shown in Table 1.

The composition of the collected press fluid, because of its non-homogenous nature, was affected by mechanical losses. The juice became richer in fat as the pressing continued, and in a sample of high intramuscular fat content the final portion was often largely fat. Therefore, differences in mechanical and evaporation losses, together with differences is sample size and juice content, made the fat content of the collected juice not strictly representative. However, it was sufficiently so to be usable. Percentage of fat content was, therefore, calculated on the basis of the loss in weight of the meat sample. There was, of course, a loss of fat and results were low, but they were assumed to be comparable.

Distribution of Fat in Meat After Pressing

The amount of fat in the sample of meat before pressing was estimated from the fat composition of the press fluid, press cake, and loss in weight of meat sample and weight of meat sample. Table 1 shows considerable variation, among the animals in the percentage of total fat that was pressed out.

Generally, with an increasing amount of fat in the meat sample there was an increase in the percentage of fat expressed. However, there were dips in the upward swing of this percentage. Moreover, the data indicate that, on the average, the percentage of total fat expressed was lower for the beef-type steers than for the dual-purpose steers. The variations may have been due to differences in the way the fat was deposited in the tissue. Factors such as sampling and losses in pressing make this difficult to evaluate. Furthermore, data in Table 2 on paired lamb legs indicate that these factors can be responsible for large differences in the percentage of total fat expressed from samples of cuts from the same animal.

Effect of Finish on Scores for Quality and Quantity of Juice and Press Fluid and Its Fat Content

Table 3 shows mean values for juiciness, percentage of press fluid and its fat content, carcass grade, and percentage of fat in the edible portion and rib eye of 9-10-11 ribs of 500- and 900-pound dual-purpose and beef-type Shorthorn steers. Percentage of press fluid was higher and scores for quantity and quality of juice were lower in the 500-pound steers than in the 900-pound ones. It appears that the scores for quality and quantity of juice are influenced by the amount of intramuscular fat and the fat content of the press fluid. Moreover, the results indicate that the percentage of

TABLE 1

Distribution of Fat When Meat From Steers was Pressed

Item	Dual-purpose-type Steer No.								Beef-type Steer No.			
	G-71	G-66	G-69	G-56	G-65	G-78	G-19	G-21	624	585	591	590
	percent	*percent*	*percent*	*percent*	*percent*	*percent*	*percent*	*percent*	*percent*	*percent*	*percent*	*percent*
Fat in meat sample (calculated)	0.77	0.85	1.01	1.09	1.32	1.46	2.63	5.29	2.35	4.64	5.63	8.36
Total fat expressed	8.82	10.00	33.00	29.79	22.41	24.62	19.64	38.45	5.35	19.72	17.94	26.73
Fat in press cake	1.13	1.20	1.18	1.24	1.72	1.80	4.50	5.59	3.79	6.75	8.22	10.89
Fat in press fluid	0.19	0.23	0.77	0.88	0.70	0.95	1.58	4.88	0.33	2.04	2.81	5.11
Loss of press fluid in collecting	14.21	31.45	11.14	27.11	14.21	16.43	14.02	19.46	11.43	13.91	14.24	12.38

TABLE 2

Distribution of Fat When Meat From Paired Lamb Legs (Left and Right) was Pressed

Item	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right
	percent	*percent*	*percent*	*percent*	*percent*	*percent*	*percent*	*percent*	*percent*	*percent*	*percent*	*percent*
Fat in meat sample (calculated)	2.80	2.90	3.10	2.40	3.33	3.76	7.39	3.54	4.22	4.04	4.21	5.30
Total fat expressed	6.37	20.08	13.23	17.45	14.89	25.14	41.89	25.19	30.81	16.72	21.35	39.11
Fat in press cake	3.97	3.22	3.84	3.33	4.73	4.16	6.53	4.03	4.77	5.39	5.18	4.76
Fat in press fluid	0.66	1.87	1.28	1.25	1.38	3.33	3.11	1.62	3.79	2.07	3.60	7.76
Press fluid	33.81	36.36	37.25	40.95	39.53	32.35	34.26	42.68	39.43	37.69	36.14	32.14

TABLE 3

Mean Objective and Subjective Values for 500- and 900-Pound Shorthorn Steers of Beef and Dual-Purpose Types

Type and weight of steers	Animals	Press fluid	Fat in press fluid	Juiciness [c]		Carcass grade [d]	Fat in edible portion of rib	Fat in rib eye
				Quality	Quantity			
	No.	*percent*	*percent*	*score*	*score*	*score*	*percent*	*percent*
Dual-purpose, 500 lb.	20	41.10	0.51	3.63	4.83	22.8	20.96	1.83
Dual-purpose, 900 lb.	23	39.14	1.85	4.28	5.20	20.4	28.45	2.66
Beef, 500 lb.	11	44.30	0.71	3.70	5.09	17.5	24.60	1.61
Beef, 900 lb.	34	40.64	2.88	4.64	5.48	12.4	38.04	4.32

[c] Juiciness was scored from 1 to 7, the former being the lowest score; the latter, the highest.
[d] The higher the score the lower the carcass grade.

press fluid tends to become lower with an increase in fat content.

Correlation Studies on 9-10-11 Beef Ribs

Table 4 shows relationships in beef between the percentage of press fluid and palatability, carcass grade, and chemical composition factors. Percentage of press fluid was significantly related to only one of these factors; there was a highly significant inverse relationship with the percentage of fat in the juice. Relationships

TABLE 4

Correlation Coefficients Between Factors of Beef

Relationships	Correlation coefficient	Probable error	Probability value
Percentage press fluid to quantity of juice	−0.01	±0.07	.....
Percentage press fluid to percentage fat therein	−0.25	±0.06	<0.02
Percentage press fluid to carcass grade	−0.04	±0.07	>0.7
Percentage press fluid to percentage fat in edible portion of rib	−0.08	±0.07	>0.4
Percentage press fluid to percentage fat in rib eye	−0.11	±0.07	>0.3
Percentage fat in press fluid to quantity of juice	+0.22	±0.07	<0.05
Percentage fat in press fluid to quality of juice	+0.36	±0.06	<0.01
Percentage fat in press fluid to carcass grade	+0.54	±0.05	<0.001
Percentage fat in press fluid to percentage fat in edible portion of rib	+0.61	±0.05	<0.001
Percentage fat in press fluid to percentage fat in rib eye	+0.71	±0.04	<0.001
Quantity of juice to quality of juice	+0.45	±0.06	<0.001
Quantity of juice to percentage fat in rib eye	+0.30	±0.07	<0.01
Quality of juice to percentage fat in rib eye	+0.39	±0.06	<0.001

with percentage of fat in the edible portion of rib and the entire rib eye were negative, but low and not significant. It appears that with an increase in fat content of the meat there was some tendency toward a decrease in press fluid.

Relationships between fat in the press fluid and the factors under consideration were all significant or highly significant. The indication is that the fat in the press fluid was closely related to the carcass grade, general fatness of the cut, and the amount of intramuscular fat. Evidently the fat content is at least one of the important factors that directly influence the scores for quantity and quality of juice. Correlation is probably considerably higher than indicated since the relationships appear to be curvilinear.

Figure 1 shows the relationship between percentage of fat in the press fluid and scores for quantity of juice. Data were condensed by dividing them into groups at three percent intervals of press fluid. Each of these groups was then divided into subgroups at 0.5 percent intervals of percentage of fat in press fluids, and the mean values of percentage of fat and scores for quantity of juice in each subgroup were plotted. These values are represented by the dots. Following this, the mean values in each 0.5 percent fat group were averaged and plotted as crosses. The resulting curve appears to indicate an increase in score for quantity of juice up to about two percent fat, after which there was little change with increase in fat concentration. If data

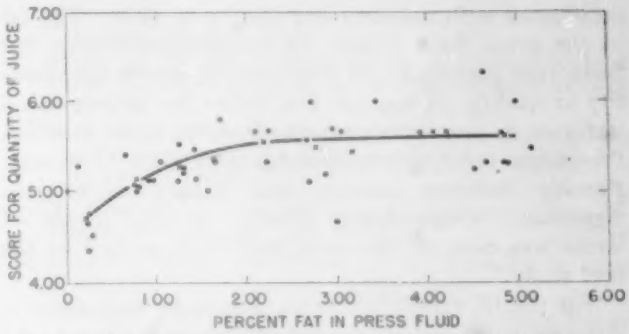

FIG. 1. Relationship between score for quantity of juice and percent fat in press fluid of beef.

around the curved part of the line in Fig. 1, that is, up to about 2.0 percent fat, are correlated, a coefficient of $+0.41 \pm 0.07$ ($N = 67$, probability <0.001) is obtained. The data around the remaining flat part of the curve have a correlation coefficient of -0.13 ± 0.13 ($N =$ probability >0.5). The curve of the relationship with quality of juice is similar.

As shown in Table 4, the relationship between quality and quantity of juice was fairly high and highly significant. There was a highly significant relationship between the two palatability factors and the percentage of fat in the rib eye. Quantity and quality of juice were closely associated and evidently directly related to the amount of intra-muscular fat. These relationships to intra-muscular fat content are no doubt similar to that shown in Figure 1.

Correlation Studies on Lamb Legs

As shown in Table 5, among the 54 paired lamb legs, there was a significant correlation between percentage of press fluid and quantity of juice. In this group, fat in the press fluid was not related to a signficant extent with percentage of press fluid. There was no important

TABLE 5

Correlation Coefficients Between Factors of Lamb Legs

Relationships	Correlation coefficient	Probable error	Probability value
54 Paired Legs of Purebred Lambs			
Percentage press fluid to quantity of juice	+0.31	±0.08	<0.05
Percentage fat in press fluid to percentage press fluid	−0.21	±0.09	<0.2
Percentage fat in press fluid to quantity of juice	−0.08	±0.09	<0.6
Percentage fat in press fluid to quality of juice	+0.11	±0.09	<0.5
Quantity of juice to quality of juice	+0.34	±0.08	<0.02
61 Left Legs of Crossbred Lambs			
Percentage press fluid to quantity of juice	+0.01	±0.09	>0.9
Percentage press fluid to carcass grade	+0.23	±0.08	<0.1
Percentage fat in press fluid to percentage press fluid	−0.09	±0.09	<0.6
Percentage fat in press fluid to carcass grade	+0.33	±0.08	<0.01
Percentage fat in press fluid to quantity of juice	−0.07	±0.09	<0.7
Percentage fat in press fluid to quality of juice	−0.08	±0.09	<0.6
Quality of juice to quantity of juice	+0.63	±0.05	<0.001
Quality of juice to carcass grade	+0.31	±0.08	<0.02
Quantity of juice to carcass grade	+0.19	±0.08	<0.2

correlation with quantity and quality of juice. The fat in the press fluid (Table 2) varied considerably but there was practically no difference in scores for quantity or quality. It appears that either the fat was not a factor or its concentration was above the point at which the judges were able to detect a difference. The relationship between quantity and quality scores was significant. Organoleptic scoring on this group of lambs was done by the same panel that worked on the beef study.

For the 61 crossbred lambs, Karakuls, and goats, a different panel judged the palatability of the meat. As may be seen in Table 5, in contrast with the previous group of lambs, in the crossbred lambs, there were no significant relationships between press fluid and the other factors under consideration. However, in agreement with the other group, there was no significant relationship between percentage of fat in the press fluid and percentage of press fluid or scores for quantity or quality of juice. There was a highly significant relationship with commercial grade of carcass.

The quality and quantity of juice were related to a highly significant extent. Quality of juice was also significantly related to carcass grade.

Karakul Sheep and Goats

The 27 Karakul sheep, ranging from one to eight years of age, had virtually no variations in scores for quality and quantity of juice, although the percentage of fat in the juice increased with age. Percentage of press fluid varied as much as 10 percent, but there was no relation to age.

The 11 goats from which legs were tested varied in age from one to four years. There was no consistent difference in scores for quantity of juice although the quality of juice scores increased somewhat with age. Percentage of fat in the press fluid tended to increase with age, while percentage of press fluid decreased.

Discussion of Results

It would appear that a great deal of the disagreement in the literature with respect to relationships between scores for quantity of juice and amount of press fluid must be due to differences in interpretation of juiciness. Hall et al. *(8)* state that quantity of juice is one of the most difficult palatability factors to differentiate from other factors. Yet it may be that these factors are to some extent a part of the quantity of juice factor, and it is neither correct nor desirable to analyze this factor too objectively.

If meat is cooked to a state of doneness which involves no serious loss of moisture, a cut with low intramuscular fat should yield a little more press fluid than one of high fat content, chiefly because of the difficulty of removing fat and its tendency to hold back the moisture. Therefore, in view of the universal belief and much evidence that meat from a fattened animal is more juicy and palatable than meat from one not fattened, there seems to be no strong foundation for the opinion that the amount of press fluid should represent scores for quantity of juice.

The part played by moisture in the juice is no doubt important, and if it should fall below a certain, as yet undetermined level, the contribution of the fat to palatability might be lessened. If two meat samples differing in intra-muscular fat content should be cooked to a state of doneness at a temperature producing a serious moisture loss, then the press fluid would be less from the cut low in intra-muscular fat and there should then result a direct relationship between percentage of press fluid and scores for quantity of juice.

Fat adds flavor, resulting in stimulation of the saliva, thus increasing the impression of juiciness, richness and smoothness. It coats the mouth, causing a lasting impression of moistness during the chewing process.

The experimental results on beef appear to agree with the above reasoning. However, the data on lamb, mutton, and chevon (goat) legs were contradictory, and on the whole indicated no consistent relationships between subjective and objective tests.

Correlation coefficients between subjective and objective tests in beef though significant or highly significant, were rather low. It is not at present possible to determine whether this is due to the apparent curvilinear relationships between percentage of fat in the press fluid and scores for quantity and quality of juice, some other factor or factors, or to the well-known unreliability of subjective tests.

Collection of the data was over a period of four years. During the work on the lamb legs there was an unavoidable change in organoleptic panels. Possibly this accounts for some of the inconsistencies in the relationship between subjective and objective tests for quantity of juice. It seems worthy of note that scores for quantity of juice of the first panel showed no correlation with amount of press fluid in beef and a significant correlation in the paired lamb legs.

Summary

Data on 97 beef rib samples indicated the percentage of press fluid was not significantly related to scores for quantity of juice. Apparently with an increase in percentage of fat in the press fluid as the result of more intramuscular fat, there was a tendency for the percentage of press fluid to decrease, and the scores for quantity and quality of juice to increase. Relationships between percentage of fat in the press fluid and juiciness appeared to be curvilinear, with the result that after about two percent fat content was reached there was little change in score.

Data from 115 lambs and sheep and 11 goats were contradictory and inconclusive. On the whole, there appeared to be no significant relationships between subjective and objective methods of assessing juiciness factors in the lamb, mutton, and chevon studied.

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Industrial and Legal Viewpoints

Chemical Agents and Residues in Foods: The Viewpoint of the Container Manufacturer[a]

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Residues of agricultural chemicals or chemical agents that are the current concern of the Food and Drug Administration are not contributed to packaged foods by their containers. But occasionally an obscure flavor change in a packaged food has been traced to the container.

The flavor pick-up has been found to be most pronounced in fatty foods, and has even been encountered in cereals and tea. Such flavor control problems arise in flexible packages or semi-rigid containers with paperboard bodies, and stem from a variety of sources, all of them obscure and difficult to trace. Wrong types of printing inks, wrong plasticizers, contaminated or musty scrap paper, bactericidal agents used in paper mills to prevent slime bacteria, and the like have been known to be the cause of off-flavors, and in very rare cases have caused foods to be inedible.

The problem of preventing these off-flavors without incurring excessive container costs requires cooperation between all parties concerned, plus systematic inspection of incoming packaging supplies.

Chemical agents and residues in packaged foods are not often the same sort of problem for the manufacturer of containers as they are for the farmer, the food technologist, the law and its enforcement officers. Problems exist, of course. And, admittedly the subject is sometimes controversial. But up to now, nobody has tried to keep me from discussing the subject. Which has been a bit of a disappointment to me, for my previous experience has taught me that the very existence of an attempt to keep my mouth closed is a sure guarantee of a lively audience interest!

Procedure

Rather than to assume that I was well informed on what the container manufacturer thinks about my subject, the problems of chemical agents and residues in foods, I asked him what he thought. Then I questioned more than 100 food processors about this same aspect of the problem, lest there be any container manufacturers who might be reluctant to reveal their problems to me. Not content with that, I then went to a considerable number of regulatory organizations for their ideas. And as a still further precaution I went to research organizations, — some impartial and some possibly partial. In all, I attempted to ascertain the problems of the container manufacturer on this subject by sending out upwards of 750 inquiries.

The following brief remarks are the result of the responses to the foregoing inquiries, and full credit should be given to my many friends and collaborators who have shared their experience and knowledge with

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me. As you may surmise, if you have had any experience in the field, some of the experience in this aspect of our problem has been gained at great cost and great industrial sorrow. Hence it is confidential as to source. We should be grateful, however, to those who have revealed their troubles in order that all may benefit and thereby avoid repeating their painful experiences.

When we analyze my part in this symposium, it is obvious that the chemical agents and residues in foods that get into the container because they were on—or in—the food material, or were put into the food by the processor, are not the responsibility of the container manufacturer. He did not put them there. But naturally the container manufacturer will be very sympathetic with any of his customers who face problems of this type, especially those customers whose products have been libelled and seized by regulatory officers because of the presence of prohibited chemical agents and residues.

In a few instances, usually isolated ones, the container manufacturer may be technologically concerned as well, should the foreign matter be the cause of chemical attack on the container. Such an instance occurred many years ago when lime-sulpher spray residues found their way into certain canned fruits and caused chemical reactions with the metal containers. These were of very great interest to can manufacturers for, in those remote days, it was the usual custom to blame the container manufacturer for practically every problem of a technological nature.

While the container manufacturer has only an indirect responsibility for the reactions of materials introduced with the foods into his containers, he does, however, have a very important responsibility for foreign chemicals that get into the food from the container itself. While none of these mishaps in recent years are matters of public health, they are nevertheless very important matters from the viewpoint of quality in the food, its consumer acceptance, and especially of quality control.

In reviewing the problems I first want to orient you on packaging, then cover the more recent history of the problems, and finally sum up where we stand today.

Among students of packaging all forms of unit packages (the package that is in contact with the product and is generally the unit of consumer purchase) are either rigid or flexible. While I have never seen any official definition of a rigid container, by common consent rigid containers include the following:

Cans, whether metal or fibre or metal ended fibre
Drums, steel and fibre
Kegs and barrels, both metal and wood
Glass containers, bottles, jars, jugs, carboys
Ceramic ware

Flexible containers, as the term implies, usually refer to packages made from:

Paper
Films, either plastics or regenerated cellulose
Metal foils
Textiles
Combinations of the foregoing

In packaging circles there is a sort of twilight zone between rigid and flexible packages. In this twilight zone we find both corrugated and solid fibre containers and their proper classification is still a moot question. Some well informed persons aver that they are rigid containers. Others, including myself, maintain they are flexible containers.

In a discussion of this sort it is not possible to include all possible information, or even to high-light all the existing information regarding foreign substances that might get into a packaged food via the container. Therefore, after dealing with the very limited public health aspects of the problem, I am going to concentrate on the angles or aspects of flexible container packaging which are of primary importance to food technologists. These are important from the viewpoint of quality control and flavor control,—not from the public health angle.

The hazards to public health, where the container itself is concerned, are of historic interest only. Except for a few imported foods I do not know of any packaged foods where there is a hazard to public health today as far as the package itself is responsible.

Among the imported items that may be suspect are the following:

1. Jams and sardines in cans with floated soldered seams instead of the conventional double seam in use in the U. S. A. Here the considerable areas of lead-containing solder in contact with the food may lead to a hazardous degree of lead contamination.

2. Tea chests lined with lead foil may contribute lead contamination to the tea by the friction of contents against the liner which will rub off in measurable quantities.

Among domestic sources of foreign or extraneous chemicals from the rigid container where there has been also a public health hazard the following may be cited:

1. The easily removable lead contamination of maple syrup which comes from terne plate buckets or tin plate buckets that have been painted with white lead paint to prevent their rusting. These buckets are used for sap collecting and are not really industrial packages. This lead hazard is largely a thing of the past.

2. Cheap pottery packages that have been given a lead glaze in the course of their manufacture may contribute dangerous quantities of lead to a food held in them. Their use is so rare that potteries which make them are scarcely to be considered as manufacturers of food packages. As a matter of historical record it may be said that such ceramic manufacturers as have produced lead-glazed jars have been most cooperative with regulatory officials and have promptly changed the type of glaze as soon as their attention was directed to the lead hazard.

3. Second hand barrels and kegs of tight cooperage were sometimes a source of dangerous lead contamination during the war. You will recall the great scarcity of containers of every sort during the war years which lead to the reuse of almost anything that could be made tight. In one case the Food and Drug Administration caught a lot of olives that were very heavily contaminated with lead. This lead was found to have come from litharge which remained in barrels in which it had been shipped originally.

We now take leave of actual or potential hazards to public health and enter a region more properly described as quality control or flavor control. Let us dispose of a number of the lesser problems before discussing the major area of these problems. Nearly everything from this point on concerns inedibility due to unpleasant flavors. In this brief review the cases where the container manufacturer has a responsibility can only be barely mentioned.

1. The adhesive was at fault in one instance where glassine had been laminated to foil. The product wrapped in this laminate acquired an off flavor.

2. Animal glues are frequently treated with a bactericidal chemical during the course of their manufacture, for it is well known that a small amount of bacterial growth in the dilute glue will impair its adhesive properties.

Seemingly a purchasing agent who was not too well informed on his glues purchased a lot that was used to make set up paper boxes for candy. And the candy acquired a chlorphenol flavor.

3. There appears to be a continuing controversy among tea tasters about the flavors contributed by wet strength paper tea balls. The few tea ball paper people I have attempted to contact have not given out any information.

4. Printing inks of the wrong composition have been frequently cited as a source of off flavors, but not as a health hazard. One manufacturer reported that printing on tea cartons had been a problem for years until the development of odor free inks. (The following is in the nature of an aside: but inks for printing paper cups or containers for cottage cheese are often specified as "lactic acid proof." The problem here is to prevent the printing from "running.")

The remedy here, as in all other packaging problems, is to be certain that all suppliers are informed of the exact purpose to which their products are to be put. And then make proper tests before going into production.

5. One incident in the history of the tin can is old stuff, but is related here to show where obscure flavor changes may arise. Some years ago canned pears had an off-flavor that was ultimately traced to a sealing compound made from smoked sheet rubber. The first remedy was to change to unsmoked latex crepe. A more recent improvement has been the use of synthetic latex.

6. In the case of various films there has been some trouble in the past. This has arisen from the plasticizers that have been used. Some plasticizers have caused off odors to develop in packaged foods.

Long storage tests have been, and still are, necessary to detect flavor changes. Because packaging films are often in direct contact with foods, it is necessary to satisfy Food and Drug Administration or Bureau of Animal Industry of their acceptability of any new film. This acceptability can be secured only after a 2-year feeding test.

7. Here is an oddity: Not all flavor changes are due to substances imparted by the package. Cases are known where the flavor change was due to the subtraction of a flavoring from the food. One such case was reported where salad dressing had been packaged in a plastic container that absorbed one of the flavoring ingredients. The food became very undesirable.

The safe rule in dealing with plastics, whether rigid or flexible food packages, is to test everything for odor, flavor and toxicity.

Having cleared away the lesser matters we now tackle some of the more obscure problems arising from flavor changes. Many of them arise from paper packages.

Many people may not be aware of the fact that paper may be re-used many times in the same general manner of re-using metals, rubber, and glass. Each of the industries using these materials has its special problems in the use of reclaimed scrap (or in more elegant language: secondary material). For example, the steel industry has been greatly concerned over the constant increase of copper in scrap iron and steel, for copper cannot be removed by any known practical method. So there is a constant build-up of copper in all our steels. It is causing many a worry, for there is not enough primary metal to supply all our needs and the need for economy through re-use is important. Other metals that are causing further concern to steel makers are molybdenum and nickel.

In somewhat the same manner, a comparable problem exists in paper manufacture. Old paper is used over and over, and frequently it carries in it certain substances that may not always be the most desirable for fabricating into food packages. One of the problems is foreign substances picked up from contents of packages where the old paper products are made with sizeable percentages of older scrap paper.

Another word of parenthetical explanation is desirable here. The paper package in its many forms is usually (though not always) the most economical package to use, provided it will provide the degree of protection needed. Hence the existence of a continuing effort on the part of packaging technologists to find suitable but cheaper packages made from paper. It is all a part and parcel of efforts to reduce the cost of distribution of food products and, hence, is highly commendable. With this brief preface we now take up paper packages in relation to the problem under discussion.

The Institute of Paper Chemistry tells me that no infectious disease has ever been attributed to paper used in food packages. Examination of upwards of 4000 samples from 49 grades of paper for Coliform bacteria gave negative results.

A plentiful,—nay generous,—supply of pure clean water is important to the manufacturer of paper and paperboard.

Paperboard having a high bacterial count, even of saprophytic types, is likely to be of poor quality and such board is often the cause of off flavors in food stuffs packaged in this quality of board. The problem is said to arise not from the bacteria but from the conditions that existed whereby the bacterial count could multiply.

Some packaged foods have been known to taste rancid without having developed rancidity by reason of leakage of fat into paperboard where it quickly rancidified. The odor then permeated the food.

Fat containing foods present the greatest problems of off-flavors picked up from packages, e.g., cocoa powder, prepared cereals, even flour, and the like. These off-flavors are usually of three sorts: (a) normal paper odor; (b) chemicals used by the paper maker to restrain the growth of slime bacteria in paper mill streams; (c) chemicals or odors existing in the scrap paper itself.

Paperboard has a normal "paper odor" that may or may not be objectionable to a food processor. Some concerns insulate the board with a barrier in the form of a waxed paper liner. Some consider that a patent coating on virgin pulp is adequate. The better informed food processors believe that if the scrap paper is stored out of the weather their own problems are minimized. One food manufacturer specifies that all paper board for making his cartons must have been dried to less than 5 percent water content, and *kept dry!*

In the baking industry the efforts to reduce costs have lead to the use of coated paper cups or pans for baking purposes, or for wrapping bakery products so that icings, etc., will not stick. At oven temperatures such coatings may melt and hence must be harmless, odorless, and tasteless.

Where waxed paper is used, the paper itself must be odorless and the wax must not have been subjected to too high a heat. Also it must have been properly refined. Here the safe rule is to make absolutely sure that the supplier knows the exact purpose to which his waxed paper may be put. Then he can cooperate intelligently.

Now let us mention a few more case histories:

8. A chocolate manufacturer reports that he has had occasional odor and flavor troubles with packaging materials due to bactericidal chemicals used in paper making.

9. A regulatory official reports that phenolic compounds in paperboard have been known to render tea and cocoa unfit for consumption though no health problem was created.

10. Diphenyl-impregnated wraps on citrus fruits have been known to cause citrus to have an off-flavor.

11. One maker of hot melt coated papers for heat sealing purposes has long and successfully used a series of chemicals hitherto unknown in the coating industry without a single complaint. His success was built on long research, testing and feeding experiments. It can be done by those who have the will.

Off odor and off flavor in dried fruits have been picked up from the board container. The food processor remedied the complaint by the simple method of specifying that the interior surface of the cartons shall be lined or faced with a *first-use* sulphite board. This gave a sufficient barrier effect.

13. An obscure case of off-flavor in ice cream packaged in paper cups was once traced to the printing ink used to imprint the shipping container. The odor passed through the corrugated board, thence through the coated sulphite cups into the fat of the ice cream.

14. Off-flavor in ice cream has also been traced to stamping inks used to date or to identify the flavor in a paper container.

15. Mayonnaise once picked up a "medicinal" odor and flavor from newsboard in the cap liner. The mayonnaise manufacturer now uses a different liner and plays safe by specifying a wax coating 0.030 inches thick for a barrier.

16. In this case a strong musty odor has been traced to insecticides. But the investigation was very long and very expensive. The odor was identified as hexachlorbenzene present in the board at the rate of 1.1 ounce per ton (0.00342 percent). The odor was strong and persisted for a year with no diminution. The question was: where did so large a quantity of hexachlorbenzene come from?

The problem was solved by what was really an heroic method. First the board manufacturer called on all the nine manufacturers of hexachlorbenzene. He persuaded them to give him a list of all their customers (insecticide manufacturers). Then he drew a large circle around every such location and issued orders that not one pound of scrap paper should be purchased in that area. This was to avoid the possibility of getting any scrap paper that had been used for shipping hexachlorbenzene.

Next he alerted every key man in his plant to smell all incoming raw materials and all outgoing finished goods.

It solved the problem.

17. Once a frozen food packer complained that the board from which his cartons were made contained excessive acetone. This, the frozen food packer claimed, would combine with the sulphur normally present in leafy vegetables and give a very pronounced off-flavor.

Research by the container manufacturer revealed that there actually was a trace of acetone in his paper board. But he never was able to reproduce the off-odor by putting the same leafy vegetable into the cartons. The trouble only occurred at the plant of the frozen food packer.

Further research showed that the odor was due to Parathion, —an insecticide,—or to one of its close homologs—presumably absorbed by the vegetable from a spray or through the roots. The off-flavor and odor could be duplicated by soaking fresh vegetables for as little as 5 minutes in water containing 0.01 percent of Parathion.

The container had been blamed for the off-odor but in this case it was due to an agricultural chemical carried into the plant inside the food. No health hazard was involved. It was simply a problem of quality control where the food technologist had been unable to solve the problem.

Summary

What does all this mean? What have we proved, if anything? I think it is fair to state that:

1. Container makers have their problems just as everybody else.

2. At present there are no problems or hazards to public health from agricultural chemicals or residues, where the U. S. A. container manufacturer has a direct responsibility.

3. The problems that do exist are quality control and flavor control problems.

4. Their solution requires the closest cooperation between the producer of packaged products and the supplier of packages.

5. If I may be permitted to put in a plug for packaging it is this: Food technologists must perforce become more familiar with the art and science of packaging, especially in the field of flexible packages.

If you have doubts about Ac'cent in your food

(as one important food processor had)

He doubted that Ac'cent could improve the flavor of his beef stew. "Our beef stew is as good as we can make it commercially," he said. And his technical staff said the same.

You can try it on the consumer (as he did)

He agreed to test Ac'cent and try it on the public. He ran two batches of beef stew, one with Ac'cent added, one without. He sent to 562 families a can from each batch, and asked them to compare the two.

And find out what he found out (that people will like your food better when a little Ac'cent is added)

Out of the 1995 persons making up those 562 families, 1131 preferred the stew with Ac'cent! Here was the CONSUMER'S answer to this manufacturer's assertion that there was no practical way to improve his product.

Ac'cent is not a flavoring, not a condiment. It adds no flavor, aroma or color of its own. It simply, but wonderfully, brings out—and holds—the natural *flavors of foods. With Ac'cent, you use your own formulas: you prepare as usual—just add Ac'cent.*

Ac'cent is a 99+% pure monosodium glutamate, derived from vegetable sources. A wholesome product of Nature. 100 and 200 lb. drums.

Trade Mark "Ac'cent" Reg. U. S. Pat. Off.

At no obligation to you, we will welcome the opportunity to demonstrate what Ac'cent can do *in one of your own foods*—to pay the cost of a test run in your plant, including payment for the materials used!

Our food technologists will conduct the test. *You* be the judge. Wire or phone for full information.

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Selected Abstracts

ANALYTICAL METHODS

1J. An extra sensitive reaction for the rancidity of fats.

LEONT'EV, I. F. *Priroda, 36,* No. 7, 62 (1947); *Food Sci. Abst., 21,* 17 (1949).

To 2 mg. of fat in a test tube with a ground-glass stopper, 2 ml. of glacial acetic acid, 0.1 ml. of a 0.01% solution of Mohr's salt and 0.5 ml. of 0.01% solution of tetramethyl-p-phenylenediamine in acetone are added. The tube is placed in a boiling water bath and then shaken. A bluish violet colour near the bottom of the liquid indicates the presence of peroxide. Even if present in a dilution of 1 in 10 million or more, it can still be detected by this test.

2J. Proximate method for detection and determination of eggs in food pastes.

KIGER, J., AND BOIVIN, R. *Chimie Analyt., 30,* 172-9 (1948); *Analyst, 74,* 262-3 (1949).

The method of Farcey which depends upon the determination of N compounds soluble in hot and cold water, is applied to the examination of pastes made with eggs, with egg-yolk powder, and with whole egg powder. The results show that the method does not lead to positive conclusions. The method relies on 2 determinations: determination of soluble N compounds precipitable by alcohol and determination of ether-extractable matter.

3J. A simple electrical meter for estimating the moisture content of grain.

RASMUSSEN, H. E., AND ANDERSON, J. A. *Canadian J. Res., 27F,* 249-52 (1949).

A simple electrical meter has been devised for estimating the moisture content of grain. It accommodates a 190 g. sample which forms the dielectric of a condenser in the plate tuning circuit of a triode crystal oscillator. An increase in the dielectric constant due to moisture in the sample is compensated for by removing capacity from a variable condenser attached to the dial of the instrument. A piezolectric plate determines the frequency at which the triode section of the tube will oscillate, and this state is indicated by a change in the shadow angle of the indicator section of the same tube. The meter has been calibrated with 159 samples of Canadian hard red spring wheat; the standard error of estimation was found to be 0.36 over the range from 10 to 17% moisture.

4J. Photometric determination of alpha- and beta-amylase in flour.

HOSKAM, E. G. *Biochim. Biophys. Acta., 1,* 419-27 (1947); *Analyst, 74,* 264-5 (1949).

Since the so-called "sticky crumb" of rye bread is attributed to the liquefying and dextrinizing action of α-amylase, a method is required to determine variable amounts of α-amylase in the presence of β-amylase. The saccharogenic action of α-amylase is less pronounced than its liquefying and dextrinizing power, whereas the action of β-amylase is mainly saccharogenic, although it appears to have some dextrinizing properties. Only if the α-amylase content is relatively large does it serve as a criterion of the quality of the flour. The extinction of an iodine-starch or iodine-dextrin solution is directly proportional to the starch or dextrin concentration for all wavelengths. Erythrodextrin, the end-product of β-amylolytic breakdown of starch, can be used as a specific substrate for the determination of α-amylase and the determination can be made in a simple way by measuring the extinction after addition of iodine solution. By isolating solid erythrodextrin the separate actions of α and β-amylase on this substrate could be studied, and it was established that the subsequent attack on erythrodextrin is governed only by α-amylase, at least during the first part of the reaction. By using a buffered solubilized starch solution instead of erythrodextrin solution, it was shown that the amount of starch broken down is an additive function of the amounts of α and β-amylase present. The amount of β-amylase can thus be found by calculation.

5J. Determination of vitamin B_1 in vegetable tissues by means of the thiochrome method.

ANTONIANI, C., AND FEDERICO, L. *Ann. Sper. Agr., 2,* 51 (1948); *Food Sci. Abst., 21,* 35 (1949).

When the thiochrome method is used to estimate vitamin B_1 in vegetables, extraneous fluorescences (particularly red) may interfere with the determination. This can be eliminated by preliminary treatment of the fresh vegetable tissue which is first dehydrated with anhydrous sodium sulphate and then completely extracted with anhydrous sulphuric ether.

6J. The fluorimetric estimation of riboflavin in foodstuffs and other biological material.

KODICEK, E., AND WANG, Y. L. *Biochem. J., 44,* 340-3 (1949).

A modification of a fluorimetric method for the estimation of riboflavin has been described. It estimates directly the fluorescence of riboflavin by using a sensitive photocell-galvanometer circuit without recourse to adsorption. Washing of the extracts with chloroform and oxidation by potassium permanganate and hydrogen peroxide reduces the interference by unspecific fluorescent substances. The reduction of riboflavin by sodium dithionite has been used to obtain the value of the blank.

7J. The fluorimetric estimation of nicotinamide in biological materials.

CHAUDHURI, D. K., AND KODICEK, E. *Biochem. J., 44,* 343-8 (1949).

A quantitative method for the estimation of nicotinamide has been developed, based on the formation of a fluorescent compound from nicotinamide on treatment with cyanogen bromide under specified conditions. The method eliminates possible interference by other compounds giving a similar fluorescence under the conditions of the test by the use of acid and alkaline pre-treatment and of a special blank. It estimates the total nicotinamide content, including the free and bound forms. The procedure gives specific and reproducible results for biological materials and for cereals, and the results agree well with the reported microbiological values. Practically all the vitamin in rat organs and muscles seems to be present in the form of the amide, bound or free. In bran no nicotinamide could be detected before or after digestion. It is assumed that the breakdown product of the 'precursor' of nicotinic acid present in bran is the free acid and not the amide. Yeast and wheat germ seem to contain about 50% of the vitamin present in the amide form, bound or free.

BIOLOGICAL SCIENCES

MICROBIOLOGY

8J. Canine salmonellosis.

KINTNER, L. *Vet. Med., 64,* 396-8 (1949).

Salmonellosis is more common in dogs than has been thought heretofore. Salmonella organisms are relatively common in substances that frequently contaminate the ration of dogs, and salmonellosis organisms can cause serious illness in dogs. However, it was not possible to cause illness by direct feeding of the organisms to healthy mature dogs.

NUTRITION

9J. Fluorine in foods.

MCCLURE, F. J. *Pub. Health Rep., 64,* 1061-74 (1949).

A survey of recent analytical data for fluorine in foods has been compiled. The majority of foods found in the average diet contain from 0.2-0.3 p.p.m. or less fluorine in the food as consumed. Tea and seafoods are notable exceptions, the former containing upwards of 75 to 10^0 p.p.m. fluorine in the dry tea, whereas seafoods may contain 5-15 p.p.m. fluorine. Cow's milk contains about 0.1-0.2 p.p.m. flourine. Fluoride added to the cow's ration or drinking water has no influence on milk-fluoride. Although the data are limited, it appears that natural food-borne fluorine is largely available for body assimilation. Exclusive of drinking water, the average diet appears to provide 0.2-0.3 mg. of fluorine daily. However, it has been observed that an additional intake of fluorine during formative tooth life, via drinking water containing 1.00 p.p.m. or slightly more fluorine, is a distinct dental health advantage. The possibility of a direct dietary flouride supplement where the drinking water does not provide a dental optimum quantity of fluorine is worthy of consideration.

(Continued on page 4)

News of the Institute

TENTATIVE PROGRAM — 1950 CONFERENCE
INSTITUTE OF FOOD TECHNOLOGISTS

Sunday, May 21, 1950

MORNING

Council Meeting, 10:00 a.m.-5:00 p.m.

EVENING

Social Hours, 5:00-7:00

Committee Meetings, 7:30-9:30

Chemical Residues in Foods, Pectin Standardization, Citrus Products, etc.

Monday, May 22

MORNING

General Session, 9:30-12:00

Welcome Address, Mayor Martin H. Kennelley

Presidential Address, Carl R. Fellers

Other Speakers

Ernest H. Volweiler, Executive Vice President, Abbott Laboratories; President, American Chemical Society

Guy E. Reed, Vice President, Harris Trust & Savings Bank, Chicago

Henry T. Heald, President, Illinois Institute of Technology

AFTERNOON

Babcock Award Luncheon, 12:15-1:45

Concurrent Sessions, 2:00-5:00

A. Symposium: Chemical Agents and Residues in Food (6 papers)

B. Industrial and Production: Cereal Technology (6 papers)

C. Research Investigations: Divided into two Divisions (6 papers each)

EVENING

Mixer, 8:00-until

Tuesday, May 23

MORNING

Section Officers Breakfast, 7:30-8:45

Concurrent Sessions, 9:00-12:00

A. Symposium: Fish and Fishery By-Products (6 papers)

B. Industrial and Production: Canning Technology (6 papers)

C. Research Investigations: Two Divisions (6 papers each)

AFTERNOON

Executives Luncheon, 12:15-2:15

Speakers:

Dr. Leverett Lyon, Chief Executive Officer, The Chicago Association of Commerce and Industry

Mr. Allan B. Kline, President, American Farm Bureau Federation

Visit Exhibitors and Personal Conferences, 2:15-5:00

EVENING

Banquet—Appert Medal Presentation, 7:00

Wednesday, May 24

MORNING

Food Technology Editorial Board Breakfast, 7:30-8:50

Concurrent Sessions, 9:00-12:00

A. Symposium: By-Products of the Packing House Industry (6 papers)

B. Industrial and Production: Candy Technology (6 papers)

C. Research Investigations: Two Divisions (6 papers each)

AFTERNOON

I. F. T. Business Meeting and Luncheon, 12:10-1:50

Concurrent Sessions, 2:00-5:00

A. Discussion Group: Frozen Foods Committee

B. Industrial and Production: Sanitation in the Food Industry (6 papers)

C. Research Investigations: Two Divisions (6 papers each)

EVENING

Dinner and Entertainment, Marine Dining Room (tentative)

Thursday, May 25

MORNING

"Guinea Pig" Breakfast, 7:30-8:50

A. Symposium: Military Subsistence of the Future

AFTERNOON

Plant Trips, From 1:00

Friday, May 26

MORNING

Plant Trips, 8:00-12:00

MEETING OF EXECUTIVE COMMITTEE

Proceedings of meeting of the Executive Committee of the Council held at the LaSalle Hotel October 30, 1949, at the call of the President.

Present: Dr. Carl R. Fellers, President
Dr. Paul F. Sharp, President-Elect
Dr. B. S. Clark
Mr. Ray Wakefield
Dr. George F. Stewart
Mr. Walter D. Pheteplace

The following attended the meeting for the purpose of rendering reports and/or advising the Council:

Dr. Lloyd A. Hall
Col. Rohland A. Isker
Mr. E. S. Stateler
Mr. C. L. Smith
Col. Charles S. Lawrence, Executive Secretary, Recorder

The meeting was called to order at 10:30 A. M., with Dr. Fellers presiding.

1. Dr. Fellers made a brief report of the status of the Institute as follows:

The affairs of the Institute have been going smoothly since the San Francisco meeting. The transfer of the Secretary's office from Amherst, Mass. to Chicago, Ill., has been about completed. Total membership to date about 2950, of which approximately 75% are members and 25% affiliates.

2. It was moved, seconded and carried that the procedure for payment of dues by new members be as follows: that the payment of the first year's dues accompany the application, the individual taking the application to examine the qualifications of the applicant and

(Continued on page 10 following technical papers)

Abstracts

(Continued from page 2)

10J. The availability of vitamins from yeast. V. Differences in the influence of live yeast on the absorption of pure thiamine hydrochloride, pure riboflavin and nitrogen by human subjects, and the effect of distribution of the vitamin doses.

GARBER, M., MARQUETTE, M. M., AND PARSONS, H. T. *J. Nutr., 38,* 225-36 (1949).

A higher percentage of a dose of thiamine hydrochloride was returned in the urine of human subjects when the supplement was ingested with meal rather than between meals. The urinary return of riboflavin was not similarly influenced. Pure thiamine hydrochloride ingested with fresh bakers yeast failed to be returned in the urine presumably through almost complete failure of absorption by the digestive tract. This was the same effect as that observed previously in respect to food thiamine ingested with live yeast. Hence, the "interference" by fresh yeast is not attributable per se to the effect of an antienzyme in the digestive tract. In the same experiment live yeast interfered less with riboflavin than with thiamine in that only the riboflavin of the live yeast cell, not that in the food or in pure form, appeared to be withheld from absorption; nitrogen was least affected, inasmuch as an average of 80% of the nitrogen of the yeast cell itself was returned in the urine. That these differences in excretion were actually due to differences in absorption tended to be borne out by fecal assays.

11J. Vitamin E in the nutrition of cattle. I. Effect of feeding vitamin E poor rations on reproduction, health, milk production, and growth.

GULLICKSON, L. S., et al. *J. Dairy Sci., 32,* 495-508 (1949).

A study was made to determine the role of vitamin E in the nutrition of cattle and especially as it relates to reproduction. A total of 30 animals of mixed breeding (8 males, 22 females), including those in the original group of their second, third, and fourth generations, were fed throughout their lives on rations providing adequate amounts of all nutritive factors known to be essential, except vitamin E. These rations would not support reproduction in rats fed in liberal amounts. Vitamin E does not appear to be required by cattle for successful reproduction, but long-feeding of rations containing very much less vitamin E than is present normally under practical conditions is likely to prove fatal to such animals.

12J. Fish solubles in poultry nutrition.

CARRICK, C. W. *Feedstuffs, 21,* 32, August 27, 1949.

When 2 to 3% of condensed fish solubles is included in a corn and soybean meal ration, the growth rate is increased to a significant extent. It is evident that fish solubles adds some unidentified factor not adequately supplied by other ingredients. About 1% of condensed fish solubles usually gives as much growth increase in female chicks as larger amounts, while about 3% is necessary for maximum growth response in male chicks, with the corn and soybean meal ration. When using a purified diet, the addition of fish solubles gives an increased rate of growth in male chicks, but not in female chicks. Fish solubles also has the unidentified hatchability factor found in animal products and pasturage, but inadequately supplied by grain and soybean meal rations. After rapidly grown chicks are 6 to 8 weeks old, the addition of fish solubles appears to have little or no effect on growth rate, when a corn and soybean meal ration is fed. Apparently fish solubles or other animal products are unnecessary for high egg production, although either such products or pasture appear to be essential for high hatchability.

FOOD PRODUCTS

FROZEN FOODS

13J. Experimental research on the quick-freezing of fruits and vegetables.

ULRICH, R. *Rev. gen. Froid, 25,* 133 (1948); *Food Sci. Abst., 21,* 19 (1949).

The results of experiments and observations relating to the preparation of fruit and vegetables for freezing and freezing process, and the thawing and use of the frozen products are discussed. The problems are considered both generally, and with reference to particular species of fruit and vegetable.

14J. A survey of frozen precooked foods with special reference to chicken a la king.

J. Milk Tech., 12, 209-13 (1949).

A survey of the bacteriological status of a limited number of frozen precooked foods was made. It was found that chicken a la king yielded total plate counts and coliform counts which were higher than reasonable standards would allow. A similar judgment would also apply to the finding of staphylococci of the food-poisoning type and enterococci, each in about ¼ of the chicken a la king samples examined. Most but not all of the other frozen precooked products sampled were by comparison of a superior sanitary status. The total number of these samples were too few to permit final judgment as to the true quality of the products tested.

15J. Liquid and frozen egg. V. Viscosity, baking quality, and other measurements on frozen egg products.

PEARCE, J. A., AND LAVERS, C. G. *Canadian J. Res. 27F,* 231-44 (1949).

Freezing irreversibly increased the viscosity of yolk and whole egg, but did not affect the white. Vigorous mechanical treatment before freezing reduced the viscosity of defrosted yolk, white, and whole egg. The viscosity of defrosted yolk and whole egg increased with increase in freezing or thawing time. Mechanical pretreatment or differences in freezing time did not affect the baking quality of defrosted egg products. Freezing reduced the baking quality of yolk and whole egg, but the baking quality improved after storage for about 3 months at —10° and 0° F., and then decreased. A thawing time of 4 hours resulted in yolk or whole egg of better baking quality than thawing times of 0.03, 24, or 48 hours. There was no relation between viscosity and the baking quality of these egg products. The addition of 2% NaCl was equivalent to the addition of 8% sucrose in preserving the foaming quality of frozen yolk.

FRUIT AND FRUIT JUICES

16J. Peeling peaches with acid.

WOODROOF, J. G. *Fruit Prod. J., 28,* 296 (1949).

The advantages and disadvantages of peeling peaches with HCl are presented. Since traces of HCl are absorbed by the peaches, browning is not a problem with acid peeled peaches. However, the small amount of the acid remaining in the peaches leaves an undesirable flavor. HCl also corrodes most metal equipment and is hard on the hands during subsequent trimming.

17J. Carbonated fruit juices.

CRUESS, W. V. *West. Can. Pack., 41,* 63, August, 1949.

Present commercial juices are not carbonated, but if such juices could be made available at prices close to those for the non-carbonated juices, it is thought they would sell in considerable volume. Methods for the preparation and packaging are outlined, together with experiments on carbonating apple and grape juices.

MEAT AND FISH

18J. Initial fillet contamination is traced to cutting tables.

CASTELL, C. H. *Food Canada, 8,* 15-18, Nov., 1948; *38,* Dec., 1948; *9,* 31-2, Jan., 1949.

Part I, Fish spoilage creates transportation problem, discusses the problems of the perishable slime coating of the fish which acts as a first-rate substrate for fish-spoiling bacteria, the microflora of the fish which is composed almost entirely of bacteria growing well at low temperatures and therefore is negligibly affected by temperatures near freezing, the methylamine oxide which is readily converted into the highly offensive methylamine gas, and the easily oxidized fat found in some fish which readily becomes rancid. Part II, Contamination of fresh fish caused by special types of bacteria presents the major sources of contamination of the round fish as sea water, the fish slime and faeces, the ice and incidental contamination coming from dirty surfaces on the boat, the bacteria of human origin, those off the boxes and storage bins in the plant and

(Continued on page 8)

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REVIEWS:

"The present volume is an excellent addition to the list of special volumes devoted to advances in special fields of knowledge." *Science*

"Here is the first volume in a projected series designed to provide a medium in which every phase of food research may be exhaustively and critically reviewed on a continuing basis. The rapid and widely spread expansion of food research, in recent years, has brought about a trend toward specialization. And that trend is causing a loss of contact between workers in the various phases of science. A co-ordinating and integrating outlet, such as is represented by this book, has therefore become highly necessary." *Food Industries*

VOLUME II, 1949, xiv, 558 pages, illustrated, $8.80

Ion Exchange Application by the Food Industry. By GEORGE E. FELTON, *Hawaiian Pineapple Company, Honolulu, Hawaii.*

Thermobacteriology as Applied to Food Processing. By C. R. STUMBO, *Food Machinery and Chemical Corporation, San Jose, California.*

The Quaternary Ammonium Compounds and Their Uses in the Food Industry. By CECIL GORDON DUNN, *Department of Food Technology, Massachusetts Institute of Technology, Cambridge, Massachusetts.*

The Pharmacology of DDT. By ARNOLD J. LEHMAN, *Division of Pharmacology, Food and Drug Administration, Federal Security Agency, Washington, D. C.*

Analysis of Foods by Sensory Difference Tests. By MILDRED M. BOGGS and HELEN L. HANSON, *Western Regional Research Laboratory, Albany, California.*

The Chemistry of Fruit and Vegetable Flavors. By JUSTUS G. KIRCHNER, *United States Department of Agriculture Laboratory of Fruit and Vegetable Chemistry, Pasadena, California.*

Histological Changes Induced in Fruits and Vegetables by Processing. By T. ELLIOT WEIER and C. RALPH STOCKING, *University of California, Davis, California.*

The Spoilage of Fish and Its Preservation by Chilling. By G. A. REAY and J. M. SHEWAN, *Torry Research Station, Aberdeen, Scotland.*

Spray Drying of Foods. By EDWARD SELTZER, *Continental Foods, Inc., Thomas Lipton, Inc., Hoboken, New Jersey,* and JAMES T. SETTELMEYER, *Maxwell House Division, General Foods Corporation, Hoboken, New Jersey.*

Author Index—Subject Index.

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Abstracts

(Continued from page 4)

the plant water supply. Part III, Initial fillet contamination is traced to the cutting table, stresses the fact that bacteria are transferred from the surface of the fish through the knives and cutting tables and by the hands of the cutters. If stored fish is washed before cutting, the bacterial count is materially reduced mainly because the fish slime containing most of the bacteria is more easily removed after some storage.

19J. The effects of processing on the vitamin content of meat.

RICE, E. E. *Food Canada, 9,* 46, June, 1949.

Small loss of nutrients occurs in the processing of fresh meat since handling itself necessitates rapidity and temperature near freezing to prevent spoiling. Some niacin is lost in the storage of fresh meat. Riboflavin, thiamine and pantothenic acid are retained almost 100%. Prolonged holding increases riboflavin and pantothenic values. Meats cured in brine lose some vitamins by leaching. Packaging meat in cans or casing of some sort before thermal processing prevents loss of heat labile nutrients. At the higher temperatures of sterilizing canned meats, the destruction of thiamine is quite apparent. Loss of thiamine is proportioned to the amount and duration of heat used. Losses of pantothenic acid, pyridoxine and folic acid parallel those of thiamine.

20J. Initial physical and chemical changes in beef as related to tenderness.

RAMSBOTTOM, J. M., AND STRANDINE, E. J. *J. Animal Sci., 8,* 398-410 (1949).

A study was made to develop information on the initial tenderness of beef and to determine the relationship of some physical, chemical, and histological changes in the beef to changes in tenderness during a 12 day period following slaughter. Experiments were made on ten beef carcasses which ranged in quality from common to choice. Objective and subjective measurements of tenderness showed that beef which was chilled in carcass form was more tender than beef which was boned and then chilled to 35° F. Beef was found to be more tender at 2 hours following slaughter than at any time thereafter for the next 2 to 6 days. By the twelfth day following slaughter, beef which was stored at 35° F. was considerably more tender than it was at 2 hours after slaughter. Beef which was frozen 2 hours following slaughter was lighter in color in the frozen state and darker in the thawed state than beef which was chilled for 24 hours or more before freezing. Photomicrographs show that marked changes occurred in the histological characteristics of the muscle fibers. These changes were correlated with changes in the tenderness of the beef.

21J. Consumer response to prepackaged fresh meats.

KRAMER, R. C. Mich. Agr. Exp. Sta. Quarterly *Bulletin 32,* 12-16, Aug., 1949.

On April 1, 1949, there were about 878 meat stores that were 100% self-service, and it is estimated that there will be approximately 1,500 stores in the U. S. completely converted to 100%

(Continued on page 9 following technical papers)

self-service by the end of 1949. A survey in one store of 330 shoppers who have used 100% self-service revealed that they principally liked it because the weight and total price are given, they can shop quicker and they can examine the meat. Further studies are needed on the technical and the economic problems of prepackaging both fresh and frozen meats. Frozen prepackaged meat still is of little significance.

PECTIN

22J. Pectins of definite combining weights from pectins of high combining weights.

PALLMANN, H., DEUEL, H., AND EICKENBERGER, E. *Swiss. 223,* 170, Oct. 2, 1944; *C. A. 43,* 4398ᵉ (1949).

The pectin is submitted to a saponification reaction with alkali. The reaction can be controlled to give products of desired molecular weight or characteristics by the amount of alkali used, control of the temperature, or by stopping the reaction with acid.

(Continued on page 9 following technical papers)

Abstracts

(Continued from page 8 preceding technical papers)

TASTE TESTING

23J. Organoleptic tests in the food industry.
GREEN, G. H. *Chem. & Ind.*, 567, Aug. 6, 1949.

Referring to a recent paper by Bate-Smith (*J. Soc. Chem. Ind., 68*, 78 (1949) it is suggested that the difficulty of assessing food quality by points scoring may be overcome by taking the product of the individual scores (geometric summation) in place of the sum (arithmetic summation).

24J. Quality in fresh cod fillets as determined by taste panel.
DYER, W. J. *Food Canada, 9*, 18-24, May, 1949.

Correlation of the palatability with chemical determination of trimethylamine content of the fish and organoleptic examination of raw fish resulted from surveys of the quality of fish in retail stores. Tests showed that aging of fish does not increase palatability as with meat; quality is steadily lowered during storage; even before spoilage tastes or odors become noticeable, the palatability is reduced to 60% of that of fresh fish. Fresh fish becomes unacceptable after 3 days storage at household refrigeration temperatures. Fish rated as "good" or "perfect" had a trimethylamine value of less than 1 mg. N/100 g., "spoiled," 15 to 30 mg. and over. The survey showed that much of the fish reaching the consumer is of "borderline quality" or worse.

VEGETABLES

25J. Effects of storage on starch and sugars contents of Maine potatoes.
TREADWAY, R. H., WALSH, M. D., AND OSBORNE, M. F. *Am. Potato J., 26*, 33-43 (1949).

Experimental data have shown that when potatoes are stored at low temperatures (35° F. to 40° F.) there is a decrease in starch content and a corresponding increase in the sugar content. The amount of change in starch or sugar content is dependent on variety, temperature, and length of storage. When potatoes are removed from cold storage to normal storage, the starch and sugar contents are increased. Commercial starch produced from stored potatoes had essentially the quality as that from freshly harvested potatoes.

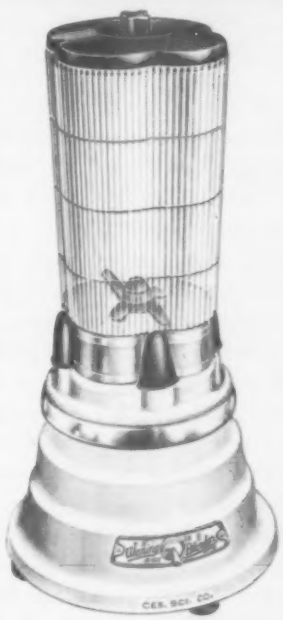
ELECTRONIC SCALE

An electronic livestock scale which weighs quickly and acurately has been developed by an aircraft corporation under the direction of the Production and Marketing Administration of the U. S. Department of Agriculture, according to that agency's August 1949 Marketing Activities. Employing electronic principles rather than mechanical principles, the scale automatically registers weights on a large dial and prints them on a ticket with the push of a button. This new, accurate, automatic, virtually fool-proof and tamper-proof scale offers possibilities for use in the fishing industry, or any industry requiring large-scale weighings, since it is not affected by dirt, rust, or moisture.

The electronic scale virtually eliminates the shortcomings of the lever-type scale. The heart of the new development—the strain-gage cell with electronic indicator—had been designed previously by the aircraft corporation. Four of the compact cells are placed under the corners of a conventional platform. Each cell electronically transmits its pressure impulse through an electric cable encased in a flexible rubber-covered conduit. The measure of the pressure on the cells is translated into the recorded weight in an indicator unit, and registered on a 16-inch dial with two concentric graduated circles, the smaller divided plainly at thousand-pound intervals to a capacity of 32,000 pounds, and the larger circle graduated in 5-pound intervals to 1,000 pounds capacity. Two indicator hands, corresponding to the hands of a time clock, combine to register a total that is clearly visible up to distances of at least 10 feet. On the lower section of the indicator assembly are red and green signal lights which show whether the unit is in operation or locked for printing.

On the printer, the third element of the assembly, a series of keys controls a set of type wheels arranged to record the number and species of animals weighed, as well as the initials of the selling agency. This unit is electrically connected to the indicator and it prints simultaneously: the registered weight on the dial, the species and number of animals weighed, and the month, day, hour, and minute in which the weighing is performed. Depending upon the size of the load, the weight value is indicated in two to seven seconds.

Time required for installation is but a fraction of that required for the normal lever-type scale. In the new device, the general compactness and the flexibility of coupling between the cells and the indicator unit establish such a degree of adaptability that the entire mechanism can be installed in approximately one hour where a lever system scale is replaced. All parts are replaceable as units, so that "trouble shooting" and repair are distinctly simplified. Commercial installation of the new scale was expected to begin in September.—*Commercial Fisheries Review*. October, 1949.



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News of the Institute

(Continued from page 3 preceding technical papers)

if, in his opinion, the applicant qualifies for membership the payment to accompany the application will be $7.50. If qualified for affiliate the payment to be $5.00. In the event an applicant qualifies for a lower status, or the application is rejected, the Secretary's office will make prompt refund.

3. It was moved, seconded and carried that the signature of the Executive Secretary only appear on membership cards.

4. It was moved, seconded and carried that the following procedure be followed with regard to membership beginning during any calendar year: When the applicant has been elected to membership and payment received, begin the subscription of the Journal with the next issue. Credit the member's account in the case of members with 63c per month for the remaining months of the calendar year, and credit the balance of the payment to his account for the following year, in which case billing for the following year will be less the payment credited. In the case of affiliates, credit will be 42c per month for the remaining months of the current year, and for student members 21c per month.

5. It was moved, seconded and carried that the Executive Secretary publish a financial statement of the Institute in the January or February issue of the Journal each year.

6. It was moved, seconded and carried that when membership dues are not paid by January 1st that a second notice be sent to the delinquent member, and that his subscription to the Journal be stopped until such time as payment is received. If payment is received after the stopping of a subscription, back issues of the Journal will be furnished only at the current sales price. Even though subscriptions are stopped a member's name will not be dropped from the rolls until every reasonable effort has been made to collect his dues.

7. It was moved, seconded and carried that the Secretary's office furnish stationery and postage to the various committees in reasonable amounts; that no payment will be made for bills contracted by committees for special stationery.

8. It was moved, seconded and carried that the Secretary's office from time to time furnish lists of deceased and delinquent members to the Secretaries of the various Regional Sections.

9. It was moved, seconded and carried that the Executive Secretary send a copy of the proceedings of this meeting to all councilors and officers of the Institute.

10. It was moved, seconded and carried that the Executive Secretary be instructed to furnish no mailing lists to other organizations, and to restrict the distribution of the Directory of the Institute to members. The Executive Secretary was further instructed to charge for addressing and mailing material for other organizations at current prevailing prices for this service, except in the case of advertisers in FOOD TECHNOLOGY, who will be furnished this mailing service at actual cost.

11. It was moved, seconded and carried that actual expenses of various committees be approved, not to exceed the following amounts:

Publicity Committee (including amounts already spent)	$400.00
Program Committee	200.00
Employment Committee's actual expenses, not to exceed	100.00

12. It was moved, seconded and carried that the Journal publish tentative programs, and the complete program for annual meetings, and other material submitted by the Publicity Committee, all releases to be submitted to the Editor through the office of the Executive Secretary.

13. It was moved, seconded and carried that the President submit reports of Committes to the Editorial Board for publication in the Journal, these reports to be published in their entirety or abbreviated as the Editorial Board deems best. However, such reports are not to be published until cleared by the Council or its Executive Committee.

14. It was moved, seconded and carried that no Council meeting be held in Atlantic City in January.

15. It was moved, seconded and carried that the Executive Secretary compile the changes in the Constitution necessary to effect incorporation, and to confer with Councilor W. L. Campbell regarding the advisability of incorporation, and report results to the Executive Committee. This action is taken because the Legal Department of the Institute's bank and a corporation attorney have stated that incorporation is a necessary measure to protect the members of the Institute, either individually or collectively, from liability for actions of the Institute.

16. It was moved, seconded and carried that the Executive Secretary confer with the Chairman of the Membership Committee for the preparation of a brochure describing the Institute, and if such a brochure can be published at a cost of $300.00 or less, to proceed with its publication.

17. It was moved, seconded and carried that the Executive Secretary be directed to mail new members a copy of the Constitution of the Institute when these are available.

18. It was moved, seconded and carried that the Regional Section Committee be requested to prepare a new listing of the boundaries of Regional Sections.

19. Because of numerous expressions of apprehension from members, the Executive Committee feels that the Great Lakes Section should carefully review the advisability of holding the 1952 meeting at Mackinac Island. The fear has been expressed that exhibitors would be loath to send their exhibits to this location, and many members feel that it would be difficult to obtain authorization for travel to Mackinac Island for a meeting.

20. The Executive Committee tentatively accepted the invitation of the Southern California Section for the annual meeting in Los Angeles in 1954.

21. After discussing sustaining members, it was decided not to take any action on this matter at the present time.

22. It was moved, seconded and carried that the following resolution be submitted to the entire Council for vote by mail:

a. RESOLVED, That the Executive Committee of the Council shall be composed of five Council members, no two of which shall be from the same Regional Section. The five members of the Executive Committee shall be elected from the active members of the Council by the following procedure: At the annual meeting the President-elect shall appoint a Nominating Committee of five Council members, no two of which shall be from the same Regional Section. The Nominating Committee shall meet prior to the close of the Annual meeting, and shall select from the list of active Council members a slate of not less than seven and not more than ten, no two of which shall be from the same Regional Section. The Nominating Committee shall present to the Executive Secretary the names of the individuals nominated, and the Executive Secretary will then send to each member of the new Council an informal ballot requesting that each Councilor vote for five of the nominees. The five who have received the highest number of votes three weeks after the mailing of the ballot shall be notified that they are members of the Executive Committee of the Council.

b. The duties of the Executive Committee of the Council shall be to act for the Council in matters requiring action during the interval between Council meetings, and at the request of the President to confer and advise with him and other officers of the Institute on any matter requiring consideration or executive action. Such interim action as may be authorized by the Executive Committee to be brought to the attention of the Council at its next regular meeting for its information and for ratification, except that for matters that the Council at one of its meetings may refer to the Executive Committee for final action shall not require subsequent Council approval.

c. The five elected Committee members shall continue in office for one year, or until the succeeding Executive Committee shall be declared elected.

d. A member of the Executive Committee may be elected to succeed himself on the Committee, provided he continues as a member of the Council.

23. It was moved, seconded and carried that the Executive Secretary be directed to study the matter of issuing members certificates of membership, and to determine the cost thereof, reporting the results of this investigation to the Council at its next meeting.

CHARLES S. LAWRENCE
Executive Secretary

1950 IFT CONFERENCE

The committee organization for the 1950 IFT Conference in Chicago is as follows:

National Program Committee: Chairman, Lloyd A. Hall, Griffith Laboratories, 1415 W. 37th St., Chicago 9.

National Publicity Committee: Chairman, Milton E. Parker, Illinois Tech, 3300 S. Federal St., Chicago 16.

Local Arrangements: Chairman, C. L. Smith, Continental Can, 4645 W. Grand Ave., Chicago 39. Vice-Chairman, R. A. Isker, Pilgrim Advertising, 222 W. Adams St., Chicago 3.

Courtesy: Chairman, W. V. Shannon, Oscar Mayer & Co., Madison 1, Wis. George W. Beach, R. W. Bates, W. F. Bronson, E. V. Cassady, Weld Conley, H. W. Conner, V. J. Del Guidice, E. F. Glabe, O. C. Hartmann, J. W. Holmquist, W. J. Imig, O. C. Johnson, J. N. Lesparre, P. P. Noznick, R. J. Remaley, J. B. Rolle, Randall Royce, E. H. Ruyle, E. M. Schoenfeld, Elsie Singruen, Mardell Tompkins, V. S. Troy.

Registration: Chairman, R. D. Trelease, Swift & Co., USY, Chicago 9. J. N. Czarnecki, L. W. Horne, H. S. Mitchell, J. J. Vollertsen, L. A. Wright.

Entertainment: Chairman, M. L. Laing, Armour & Co., USY, Chicago 9. G. M. Chapman, J. W. Kellogg, A. E. Maren, G. B. Perlstein, F. N. Peters.

Ladies Entertainment, Sub-Committee: Chairman, Dorothy A. Huber, QMF&CI, 1849 W. Pershing Rd., Chicago 9 . Alice Amis, Mignon Gill, Frances Hemphill, Margaret Ives, Catherine Walliker.

Exhibits: Chairman, L. E. Clifcorn, Continental Can, 4645 W. Grand Ave., Chicago 39. J. H. Bunting, R. H. Ingham, G. T. Peterson, D. J. Wessel.

Field Trips and Transportation: Chairman, V. O. Wodicka, Libby, McNeill & Libby, Blue Island, Ill. C. G. Barton, L. E. Jackson, J. S. Kujawski, A. E. Mudra, W. J. Mutschler.

Finance: Chairman, R. M. Schaffner, Libby, McNeill & Libby, USY, Chicago 9. G. E. Brissey, E. W. Hopkins, D. E. Perham, B. M. Shinn.

Hotel Arrangements: Chairman, E. S. Stateler, Food Industries, 520 N. Michigan Ave., Chicago 10. R. D. Baxter, F. D. Buchanan, A. A. Kiess, L. P. Martens.

Publicity and Printing: Chairman, R. A. Stegeman, QMF&CI, 1849 W. Pershing Rd., Chicago 9. Armen Adajian, H. F. Clew, G. A. Crapple, R. A. Klein, G. E. Siebel, R. I. Tenney, C. K. Wiesman.

National Program Committee Chairman Lloyd Hall has already made considerable progress in arranging a program for the Conference, having convened his committee during the fall A. C. S. meeting in Atlantic City. Lloyd is saving the details for the February issue of *The Vitalizer*, house organ of the Chicago Section, which will be given national distribution. He promises a program designed to attract a record attendance.

NEW REGIONAL SECTION?

It is rumored that a group of food technologists in the region of Raleigh and Richmond, Virginia-Carolina, have already had two meetings and are hoping to form a new Regional Section of IFT.

PLANT SANITATION PANEL

A transcript of the panel discussion on plant sanitation which was held at the Ninth Annual IFT Convention in San Francisco was published in the November, 1949 issue of *Modern Sanitation;* starting on page 31.

Regional Section News

CHICAGO SECTION

At the October 1949 meeting of the Chicago Section, Colonel Paul P. Logan, Director of Research, National Restaurant Association, spoke on the subject of "Food Technology Applied to the Public Feeding Industry."

On November 21, members of the Chicago Section met at the plant of the Schlitz Brewery Co. in Milwaukee, Wisconsin, where there was an opportunity to inspect the operations of brewing and bottling of beer. A "spread" provided by courtesy of the Schlitz management was enjoyed at 6 p. m. The speaker of the evening was Mr. M. D. Sanders, in charge of the Chemical Engineering Division, Swift & Co. Research Laboratories. Mr. Sanders' topic was "Water and Industrial Waste in the Food Industries."

Analysis of the 1949 IFT membership in Cook County, Ill., as representative of the Chicago Section, shows that the membership represents a total of somewhat more than 155 different organizations. This means a job well done on the part of the Membership Committee in interesting technologists in most of the food processing or distributing organizations in the Chicago

area. Of these organizations, however, the majority include less than seven IFT members each, and only six include from 20 to 30 IFT members each. Hence there is still a fertile field for recruiting in companies not now represented in the Section and in the companies having only a small number of IFT members.

Dr. John M. Jackson, formerly Assistant Chief of the Packaging Research Section, American Can Co., Maywood, Ill., was transferred on June 1, 1949, to the West Coast to become Assistant Manager of Research for the Pacific Division of the American Can Company, with headquarters in San Francisco, California. While en route by automobile to assume this position, he was involved in a serious accident in Omaha, Nebraska, which necessitated a hospital sojourn. Happily he has now recovered to the point where he is convalescing at home. Dr. Jackson was Secretary of the Chicago Section from 1946 through 1949 until he resigned upon leaving for California. It is hoped that his recovery will soon be complete.

Dr. William J. Shannon, of Oscar Mayer & Co., Madison, Wisconsin, and Chicago, Ill., addressed the graduating class of the Wisconsin Medical School in the fall of 1949. His topic was "The Importance of Federal Meat Inspection to Public Health."

Elsie Singmen, Technical Consultant of Chicago, was one of the speakers at the Industrial Waste Conference at Purdue University on November 29-30. Her topic was "The Utilization of Brewers Yeast."

Chicago Section members who appeared as guest speakers at the Dairy and Food Technologists and Sanitarians Conference, University of Illinois, November 1-2, included A. I. Kegan (Kegan and Kegan), M. L. Laing (Armour), and H. D. Lightbody (QM Food & Container Institute).

C. E. Maier (Continental Can) has been made general manager of research. Mr. Maier was previously assistant to the vice-president in charge of research and engineering.

The recent election of officers of the Chicago Chemists Club for the 1949-50 term resulted in the selection of James D. Ingle (Swift & Co.) as president and G. T. Peterson (Continental Can) as treasurer.

Among those responsible for the success of the American Oil Chemists' Society annual fall meeting, recently concluded at the Edgewater Beach Hotel, were: H. T. Spannuth (Wilson & Co.), program chairman; R. W. Bates (Armour & Co.), trip chairman; K. F. Mattil and V. C. Mehlenbacher (both of Swift & Co.), session chairmen. Mehlenbacher, incidentally, is president of the Society.

James H. Bunting, Technologist (Campbell Soup), has been transferred to the home office in Camden, N. J., to enter Product Research. Mr. Bunting will be replaced at the Chicago Campbell Soup plant by O. C. Wagner, formerly assistant staff technologist at the Camden plant.

Fred W. Tanner is on leave from the University of Illinois and is now located in Florida. He expects this to be a permanent move. His present address is 921 Lincoln Circle, Winter Park, Fla.

William M. Fosdick, of Armour & Co., Chicago, has left the Yards in favor of Birmingham, Ala., where he is General Sales Supervisor for southeast U. S. on veal, lamb, and frosted meats.

The next issue of *The Vitalizer* will appear in February, 1950. This issue will contain advance programs for the 1950 IFT Conference and will have national distribution.

GREAT LAKES SECTION

The Great Lakes Section's Fall Meeting was held November 4 at Battle Creek. Battle Creek's fine hospitality was keenly felt by all attending. Plant tours were conducted through (1) The W. K. Kellogg Co. (2) Post Cereals Div. of General Foods, and (3) The Michigan Carton Co., largest and newest paper board mills for food industry cartons in the world.

More than 100 members and guests participated in the plant tours, together with the afternoon session which was held at The Battle Creek Country Club.

The executive committee met with Chairman Roy E. Marshall at noon to discuss (1) methods of getting new section members, (2) increasing our section's councillors to the National Institute from 1 to 2 as permitted by our qualified membership of more than 100, (3) the 1952 meeting to be held at Mackinac Island, Grand Rapids or other suitable spot as determined by a poll of sections and exhibitors by R. B. Wakefield's committee.

The afternoon session which began at 2:00 P. M. included the following papers:

The use of dehydroacetic acid as a microbiological stabilizer for foods, by Dr. Paul A. Wolf, Dow Chemical Co.
Stock feeds and animal nutrition by Mr. Max Cooley, General Mills, Larrowe Div., Toledo, Ohio.
Progress in quality of infant-food, by Dr. W. L. Thompson.
Discussion of food sanitation problems, Dr. F. W. Fabian, discussion leader.
Business session and recess followed.
Dinner at 6:30 P. M. Evening speaker at 7:30 P. M. was Mr. Charles W. Kaufman, General Foods Corp., who spoke on frozen orange juice concentrate development.

The Winter Meeting will be held January 20, 1950, 2:00 P. M. at the Sheraton Hotel, Detroit, Michigan.

NORTHEAST SECTION

Members of the Northeast Section met on December 1, 1949, at Northeastern University, Boston, Mass. Speakers of the evening and their topics were as follows:

Mr. I. Claude Shea, Seven-Up Bottling Co., Boston, Mass. Topic: "Carbonated Beverages."

Mr. W. O. Brockert, Executive Vice-President, Croft Brewing Co., Boston, Mass. Topic: "Malt Beverages."

Mr. Marron W. Fort, General Manager of A. & G. S. Caldwell, Inc., Newburyport, Mass. Topic: "Distilled Beverages."

New members who joined the Northeast Section in the fall of 1949 include:

J. Angeline, A. D. Little, Inc., Cambridge, Mass.
C. Angell, Artisan Metal Co., Boston, Mass.
H. P. Bowra, Fritzsche Bros., Inc., Boston, Mass.
Anthony Corrente. E. L. Patch & Co., Boston, Mass.
J. S. Getchell, Maine Agric. Expt. Sta., Orono, Maine.

Mrs. Jean Murray Gainer, Dept. Food Tech., M. I. T.
R. L. Keenan, Waltham, Mass.
M. P. McArdle, Boston, Mass.
W. A. McKinney, J. O. Welch Co., Cambridge, Mass.
J. O'Brien, E. M. Noel Co., Boston, Mass.
V. Otto, A. D. Little, Inc., Cambridge, Mass.
H. Petreault, J. P. Squire Co., Boston, Mass.
Robert Poling, Boston, Mass.
G. A. Rice, Waltham, Mass.
L. M. Richardson, Lever Bros. Co., Cambridge, Mass.
M. Selby, MacDonald Laboratories, Boston, Mass.
L. Shipman, Minute Tapioca Co., Orange, Mass.
H. B. Swett, U. S. D. A., Boston, Mass.
R. E. Watson, Calgon Inc., Boston, Mass.
M. Wilmer, A. D. Little, Inc., Cambridge, Mass.
Milton Wolf, A. Wolf & Sons, Boston, Mass.

Students in Department of Food Technology, Massachusetts Institute of Technology, Cambridge, Mass.:

D. S. Bhatia
F. Bronner
M. Feingold
Miss O. Hammerle
N. L. Lahiry
D. Lang
J. P. O'Meara
H. V. Shuster
J. A. Stern

Professor B. E. Proctor, Director of the Food Technology Laboratories, Massachusetts Institute of Technology, is the Chairman-Elect of the Division of Agricultural and Food Chemistry, American Chemical Society, and the Chairman of the Program Committee of this Division for 1950.

OHIO VALLEY SECTION

The first meeting of the Ohio Valley Section of the Institute of Food Technologists was held at the Hotel Gibson, Cincinnati, Ohio, on October 8, 1949. (The Ohio Valley Association of Food Technologists was granted a sectional charter at the annual convention of the Institute last summer in San Francisco.)

The afternoon program was composed of the following papers:

"Application of the Principles of Statistical Control to the Manufacture of Glass Containers"—Fred Dellwo, Ball Bros. Co.

"A Review of the Applications of Fats and Oils in the Food Industries"—F. J. Coughlin, The Proctor & Gamble Co.

"What Management Expects from the Food Technologist"—S. M. Blakemore.

"Highlights of the I. F. T. San Francisco Meeting"—George Garnatz, The Kroger Co.

A ousiness meeting followed the technical session. The results of the election of councilors were announced, which completed our executive committee. This committee is composed of:

Section Chairman—N. H. Volle.
Section Vice Chairman—H. D. Brown.
Secretary-Treasurer—D. J. Ridenour.
Section Councilor—Dan McCoy.
Executive Committeemen—Two-year term—A. J. Glazier, R. A. Wait; One-year term—R. B. McKinnis, F. D. Deatherage.
Section Membership Chairman—Fred Dellwo.

Winter Meeting to be hold in Columbus, Ohio, on February 11 or February 18, 1950.

A fine dinner followed the business session, after which Mr. Edward B. Evans spoke concerning "What the Food Technologist Should Know About the Patent System."

SOUTHERN CALIFORNIA SECTION

On November 18, members of the Southern California Section met for a field trip, dinner, and scientific program at the Swift & Co. Los Angeles Refinery. During the afternoon there were field trips through the plant. In the evening, following dinner, the members were addressed by Mr. T. C. Bond, Chief Chemist of Swift's Zone Laboratory in Los Angeles. His topic was "Quality Control in Swift and Company Zone Laboratories." Earl C. Rasmussen, Chemist at Armour & Co., was the discussion leader of the evening.

In September, 1949, the Southern California Section joined the ranks of those Regional Sections who are now publishing monthly news bulletins regarding section activities. The editor of the "IFT Monthly Bulletin, Southern California Section" is R. G. Rice, Fruit & Vegetable Chemical Laboratory, 263 S. Chester Ave., Pasadena 5. The Meeting Reporter is M. G. Morehouse, Department of Biochemistry and Nutrition, University of Southern California. The Field Reporter is Reed Sutherland, Bireley's, 1127 N. Mansfield Ave., Hollywood.

At the October 1949 meeting, it was reported that members of the Section will be present on Station KFI-TV "Report to Mrs. America" (3:15-3:30 p. m.) on the third Thursday of each month. Rolly Langley is in charge of the program. Miss Sara N. Blangsted, Chief Chemist, Mission Dry Corporation, appeared over television on October 6 as the guest star and described her work as chief chemist. Mr. W. C. Cole, Research Director of the Arden Farms Co., was the guest on October 27 and demonstrated the method of fat analysis of ice cream.

The following meeting schedule has been planned by the Section:

January 13, 1950. Field Trip. Helm's Bakery, lunch at Helm's at 12:30 p. m. Luncheon speaker, Paul Helms, Jr.
February, 1950. Fourth Annual Meeting (all day).
March 17, 1950. Field trip, U. S. D. A., Fruit and Vegetable Chemical Laboratory, 1:30 p. m. Dinner at a Pasadena hotel. Dinner speaker, M. J. Copley, Director, Western Regional Research Laboratory.
April 19, 1950. Dinner meeting. A. A. Dickerman, Attorney General Counsel's office, Federal Security Agency, Washington, D. C. Subject: "The Lawyer and the Food Technologist."
May, 1950. Open.

The following new members have been added to the Section:

Eldon K. Bacon, Biochemist with Van Camp Sea Food Co.
J. J. Carlin, Technical Sales, Dow Chemical Co.
Bruce L. Durling, Sales, Wm. J. Stange.
Kenneth F. Gibsen, Chemist, Kelco Co., San Diego.
Edgar J. Kelly, Chem. Eng., C. E. Howard & Co.
Norman E. Kern, Sales, Central Scientific.
Thomas M. Lukes, Microbiologist, Real Gold Citrus Products.
R. W. Mojonnier, Sales Engineer, Mojonnier Bros. Co.
Helen M. Pariseau, Dietitian, Birmingham General Hospital.
R. R. Pitcher, Chemist, Real Gold Citrus Co.

Robert S. Roe, U. S. Food & Drug.
Jula A. Samuely, General Mgr., Live Food Products Co.
C. B. Stevenson, Chem. Eng., Coast Fishing Co.
Henry Tranmal, Bacteriologist, Arden Farms Co.
E. L. Vandercook, Business Mgr., El Molino Mills.

ST. LOUIS SECTION

On September 9, 1949, members of the St. Louis Section met at the plant of Anheuser-Busch, where they heard short talks on recent developments of barley, milling, and feeds by speakers from Anheuser-Busch, Pillsbury Mills, and Ralston Purina Co., respectively.

On October 13, 1949, there was a meeting at the oleomargarine plant of Blanton & Co. Dr. Lanier, Technical Director, gave an abstract of operations, and members then made a tour of the plant.

On November 22, 1949, a meeting was held at the St. Louis College Pharmacy. Mr. H. E. Wiedemann, St. Louis Consulting Forensic Chemist, spoke on court experiences, food contamination, poisons, and patent cases.

NEW YORK SECTION

The first fall meeting of the New York Section opened with a dinner at the Stonewall Inn on October 19, 1949. Dr. T. A. White, Chief Chemist of National Starch Products, Inc., discussed the different types of starch used in food manufacture and emphasized practical applications for optimum results.

The keynote of the meeting on November 16, 1949, was centered in biological problems confronting the food technologist in his daily work. There were three speakers, as follows:

Dr. Robert P. Myers, Director of Microbiological Research, National Dairy Research Laboratory. Topic: "Some Microbiological Problems in the Dairy Industry."

Donald H. Warren, in charge of quality control, Continental Foods. Topic: "Bacteriological Problems in Some Dried Foods."

Dr. C. Olin Ball, specialist in food technology, Rutgers University, and Editor of *Food Technology*. Topic: "Sanitation and Sterilization in Canning."

Miss Alice Wilson of *Food Industries*, who became Mrs. Stanley F. Merritt in September, 1949, is the local Publicity Committee Chairman of the New York Section for the current year. This is the first time the New York Section has had a Publicity Committee, and the Section has chosen well in its selection of the first chairman.

J. H. Nair, of Continental Foods, Inc., addressed food technologists in the Virginia-Carolina section in Raleigh on November 28, 1949. His subject was "Art versus Science in Food Technology."

Frank K. Lawler, editor of *Food Industries*, addressed the Chemical Enginers Club of Washington at a public meeting held in the Jefferson Memorial Auditorium of the U. S. Department of Agriculture, on November 9, 1949. He explained the rôle of the food technologist in industry, stressed the need for more technologists and engineering minds in the food processing industries, and emphasized that the provision of agricultural "know-how" to backward countries must be accompanied by knowledge of processing and storage of food.

On January 18, 1950, members of the Section heard a talk on "Developments in Nutrition" by Dr. R. S. Goodheart of the National Vitamin Foundation.

The 1951 Annual IFT meeting is scheduled to be held in New York in June, at the Hotel New Yorker. Co-Chairmen of this meeting are:

Stephen L. Galvin, Huron Milling Co.
John H. Nair, Continental Foods, Inc.

A new "Food Law Institute, Inc." was launched at a dinner ceremony at the Waldorf-Astoria on November 16, 1949. This is a non-profit organization formed by executives in the food industry and supported by contributions from several large food companies. Charles Wesley Dunn, President of the Institute, has announced that the objective of the Institute is to "develop post-graduate instruction and research in food law at university schools of law." A minimum annual income of $50,000 has been planned, to accomplish this objective. The first major activity of the Institute was the establishment last September of two courses in food law at the New York University Graduate School of Law, which was given a grant of $35,000 for instruction and research studies in the current academic year. The law schools of the universities of California, Washington, and Minnesota have expressed interest in such courses. The Harvard Graduate School of Business Administration has agreed to cooperate in the Institute's program, beginning with a series of introductory lectures in 1950.

PHILADELPHIA SECTION

In November 16, 1949, the Philadelphia Section of IFT held a joint meeting with the American Association of Candy Technologists at Community College, Temple University. The program was a symposium on "Plant Sanitation." The speakers and their topics were as follows:

Dr. Harold G. Lederer, Director of Biological Research, R. M. Hollingshead Corp., Camden, N. J. Topic: "Sanitary Chemicals."

Fred B. Jacobson, Plant Entomologist and Sanitarian, Stephen F. Whitman and Sons, Inc., Philadelphia. Topic: "Plant Sanitation."

Robert C. Stanfill, Chief, Philadelphia District, U. S. Food and Drug Administration. Topic: "Sanitation With Reference to Federal Regulations."

Hans F. Dresel of the Felton Chemical Co., Brooklyn, N. Y., served as moderator at this symposium.

Professor Walter L. Obold of the Drexel Institute of Technology is the local representative of the Philadelphia Section on the national IFT Employment Committee.

Walter Maclinn, Chairman of the Department of Food Technology at Rutgers University, is supervising a program of research and instruction. Principal research problems relate to prolonging the life of fresh foods after they have been harvested or slaughtered.

C. Olin Ball, editor of *Food Technology*, is now Professor of Food Technology at Rutgers University. Frank Halleck, Bruce Morgan, Albert Sheinfeld, Miss Eugenia Orthey, and Mrs. Elizabeth Stier are graduate students. Mr. Melvin Frank is Operating Engineer and Miss Roberta Hucks is Chemist.

G. Victor Hallman, Director of Research, Campbell Soup Co., Camden, N. J., has recovered from a siege of illness suffered in the fall of 1949 and is now back at work.

Oscar C. Wagner, also of the Campbell Soup Company in Camden, N. J., has been transferred to the Chicago plant to assume the duties of technologist.

James J. Spartales, of the Campbell Soup Company's Camden plant, has left the Control Laboratory for the Products Research Department.

E. Everett Meschter has been elected a Councilor to serve on the IFT Council Executive Committee.

MARYLAND SECTION

On November 11, 1949, the Maryland Section met first at the new laboratories of Strasburger and Siegel, Baltimore, for cocktails. A dinner and business meeting were then held at the Hotel Stafford. Following the business meeting, Dr. H. H. Mottern, Director of Research, H. J. Heinz Company, Pittsburgh, spoke on "Inside Lycopersicon." Sound movies and colored slides were shown during the address.

AMES SECTION

On November 18, 1949, the Ames Section met at Memorial Union in Ames for a dinner meeting. Following dinner, there were two speakers:

Mr. George Sheehe, Agricultural Representative for Iowa's Chain Stores Council. Subject: "Consumer Food Preferences."

Dr. Ralph Baker, Economics Department, Iowa State College. Subject: "The Producer's Share of the Consumer's Food Dollar."

CROP NEWS

Output for the crop year 1948-49 has been good in the Northern Hemisphere, but is below the particularly favorable level of the previous season.

Taking each major commodity in turn, the world situation is tentatively found to be as follows: *Wheat* is down from last year by about 3 percent but is 9 percent above prewar. *Rye* is unchanged from last year. The world *rice* crop may be somewhat smaller, owing to slightly less favorable weather conditions. *Maize*, despite a very favorable early showing in North America, which produces nearly two-thirds of the total crop, is down for the world as a whole as much as 8 percent from last year. *Potato* production is much reduced (22% below last year) because of a dry summer in both Europe and North America and a smaller area planted on the latter continent. The *sugar* crop is expected to be about equal to last year's, with an increase in European production and some decline in the major production for export (such as that of Cuba). *Livestock* production has made a strong upturn in Europe and North and Central America and is increasing in Australia and New Zealand. Although crops are below last year's, stocks on hand are much larger in the United States and Canada and are sufficient to provide an ample margin for the importing countries.

World totals are subject to modification, depending on the outcome of the crops now beginning to be harvested in the Southern Hemisphere. Present indications are for a good crop in Australia, with excellent yields of wheat, barley, and oats in all areas except part of the south and west where more rain is needed. In Argentina the area planted to wheat is estimated to be half a million hectares above last year's, and weather conditions so far have not been unfavorable. In the Union of South Africa, where dry weather has continued for a long period of time, wheat output is expected to be normal and maize production is not likely to be as low as last year's poor crop.

In rice-producing countries, Japan reports a record crop and Thailand has prospects of increasing its crop by nearly a million tons over that of the previous season. Despite floods in certain areas, crop conditions are generally satisfactory in India. A reduced rice production is expected in such major rice-exporting countries as Burma, where the area planted has been reduced by about 20 percent from last year.

The Northern Hemisphere countries have largely completed their fall sowing, which took place under particularly favorable conditions in most areas. A few countries in Europe indicate a lack of soil moisture because of the dryness of the past summer. One factor that may considerably affect acreage seeded and crop output is the planned reduction in acreage by the United States. Although final decisions have not been taken, it is expected that the area planted to wheat will not exceed 30 million hectares, a reduction of 3 million hectares from last year's. Areas in maize, cotton, potatoes, and rice also face a reduction under the United States acreage allotment scheme.—*F. A. O. Food and Agricultural Statistics*, December 1949.

FOOD TECHNOLOGISTS OF MANITOBA ORGANIZE

Food technologists of Manitoba have organized under the name of "Manitoba Food Technology Association." This new organization composed of people working directly with the scientific phase of food manufacture, was born during an organizational meeting held in Winnipeg in October, 1949.

At this meeting the following officers were elected:

President—Dr. E. C. Chamberlayne, Provincial Department of Health and Public Welfare.

Vice-President—Mr. A. Lorne Shewfelt, Dominion Experimental Station, Morden.

Secretary—G. W. Andrich, Canada Packers Limited, St. Boniface.

Program Committee Chairman—Dr. E. J. Rigby, City of Winnipeg Health Department; Mr. W. J. Rawlinson, Kraft Food Company; Mr. J. G. Laird, Canada Packers Limited, St. Boniface.

The meeting closed with a description by Mr. Shewfelt of specialized courses available in North America on Food Technology.

SELF-SERVICE MERCHANDISING OF MEATS ANALYZED

Meat sales increased in 46 out of 51 stores that converted their service meat departments to the prepackaged, self-service method of merchandising, and customer reaction to the innovation was good at all but 2 out of 97 self-service stores surveyed, according to a report prepared by the Production and Marketing Administration, U. S. Department of Agriculture.

The study was made under authority of the Research and Marketing Act. It covered costs, packaging methods and materials, merchandising practices, and some of the unsolved problems in selling meat on the self-service basis.

The survey covered 65 chain and 32 independent stores in 80 cities in all sections of the country. Of the stores, 51 had converted from service to self-service, and the remainder had been self-service since opening.

Other factors than the shift to self-service may have been partly responsible for the increased sales, notably the fact that, in making the change, the stores generally modernized their meat departments. However, the volume of sales usually rose after the change and then leveled off at materially greater totals than had been achieved on the service basis; and the number of stores having self-service meat departments rose from about 400 in operation at the time of study to about 1,200 in less than a year.

Acceptance of the new merchandising method by consumers was reported as "enthusiastic" at 67 stores and "moderately enthusiastic" at 28 more, judging by the comments of the customers.

The items on which there were the most reports of increases in sales were luncheon meats, beef steaks, beef roasts, poultry, and specialty products such as heart, liver, brains, and tongue. There were decreases in a few stores in sales of smoked ham, sea foods, pork roasts, and a few other individual items.

The principal reasons given by customers for liking the new method were that it eliminated waiting, provided a better selection of meats, and permitted purchases in amounts to suit the household budget. Those who disliked the self-service system gave as their principal reasons that they missed the personal contact with store personnel and that they preferred to see their meat being cut.

All the fresh meats and the greater part of all other meat items, except frozen meats and frozen poultry, were prepackaged in the stores surveyed, rather than at other points in the marketing channel such as the wholesaler's or packer's plant.

The study showed that total labor costs of the self-service meat departments averaged 4.5 cents per pound of meat handled, or 5.2 cents per package. There was considerable variation in the amount of meat handled per man hour of labor, ranging from an average of 17 pounds per man hour in stores having a weekly sales volume of $2,000 or less, to 29 pounds per man hour in stores with a volume of more than $10,000.

Stores handling the smaller volume of meat had higher labor costs per pound and per package than those with larger volumes. One factor in this was the apparent use of skilled workers in the smaller stores in doing unskilled work. Skilled meat cutters, for example, sometimes were used for such work as wrapping and sealing, where unskilled labor would have been adequate. The proportion of unskilled labor to skilled was higher in the stores with the larger volumes of business, giving an apparently better balanced labor force.

Stores with a weekly volume of more than $10,000 had an average of 76 linear feet of refrigerated display cases, and average weekly sales of $146 per foot. This was about twice the display-case length and four times the sales per linear foot for stores doing a volume of $2,000 and less.

Three-fourths of the retailers reported that fresh beef, veal, pork, and lamb remained in salable condition in display cases for 48 to 72 hours. Most of them said 48 hours was the desirable limit.

Ninety of the 97 stores continued to provide special service for those who asked for it. The most common request was for meat in cuts of different thicknesses from those on display.

The principal problems facing the trade in operating self-service meat departments were reported as follows: (1) Discoloration of the meat, (2) the need for improved packaging techniques, and (3) improving the efficiency of labor.

The report discusses the types of wrapping material used most widely for the different kinds of meats, packaging equipment, spoilage rates, display practices, the ratios of skilled to unskilled labor, wage rates, and other factors affecting this type of merchandising.

Copies of the report are available from the Information Branch of PMA, Washington 25, D. C.

CONFERENCE ON IRRIGATION WATERS

On January 27, 1950, there will be held in El Paso, Texas, a conference on polluted irrigation waters. This meeting is being sponsored jointly by the Environmental Health Study Section, National Institutes of Health, Public Health Service, Federal Security Agency, the El Paso Texas Health Department, and the Texas State Health Department.

The program will be devoted to discussions of general problems on irrigation waters in several western and southwestern states, current research relative to the incidence and behavior of pathogenic organisms in irrigation waters, vegetable washings, and soils, and epidemiological aspects of sewage polluted irrigation waters. In addition, papers will be presented on the utilization of waste water, impounding and use of water of the Rio Grande, machines for vegetable washing, present standards for irrigation water, and use of sewage sludges for soil improvement.

All persons interested in this phase of environmental health are cordially invited to attend the meeting. Copies of the program will be sent at a later date, upon request.

Inquiries should be addressed to Mr. Irving Gerring, Executive Secretary, Environmental Health Study Section, Division of Research Grants and Fellowships, National Institutes of Health, Bethesda 14, Maryland.

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WORLD MILK UTILIZATION

The allocation of milk to various uses—fluid, butter, cheese, etc.—is dependent in large measure on the price relationships among the various outlets. In a few instances, however, it is influenced by government controls other than price fixing measures. During the war and in the period immediately following, recognition of the importance of milk in the diet led governments in many countries to encourage greater use of milk for liquid consumption. In some European countries this was carried through in spite of disruption to the fluid milk delivery system.

It is estimated that about 54 percent of the prewar milk production of major areas (other than India and U. S. S. R.) was used for manufactured dairy products —primarily butter and cheese—and only about 39 percent was used for liquid consumption. In 1948, about 49 percent of the milk produced in these areas was used for manufactured products and 43 percent was consumed as liquid milk.[a] Approximately 35 percent of the total milk production in 1948 was used in the manufacture of butter, and about 11 percent in the manufacture of cheese. Other dairy products such as canned, evaporated milk, dried whole milk, and ice cream are becoming more important, although in most countries they are still produced in very small quantities.

Western and Central Europe made the biggest shift between prewar and 1948 in the proportion of its milk production used in fluid form. In Eastern Europe, where milk production in 1948 was only 63 percent of prewar, the proportion used for liquid consumption remained at about the prewar level. Serious disruption of the fluid milk distribution system, together with less emphasis on the use of fluid milk than is given in Western Europe, probably accounted for this. The South American countries showed a decline in the proportion of milk used for liquid consumption. This was largely the result of increased butter production in Brazil and Argentina, brought about by price relationships.

Total output in North America in 1948 was significantly higher than prewar, and the absolute quantity used for liquid consumption increased by 29 percent. In Oceania, total milk output in 1948 was at about the prewar level, but the volume used for liquid consumption was 30 percent higher. In Western and Central Europe, on the other hand, total milk output was much lower in 1948 than in the prewar period. The significant factor is, however, that in spite of the decline in total European output, the quantity used for liquid consumption was at about the same level as prewar.—F. A. O. Commodity Series Bulletin No. 16, September, 1949.

[a] If India and U. S. S. R. were added to the other major areas, a somewhat higher percentage of the total milk output would fall into the manufactured classification because of the high production of ghee in India and of butter in the U. S. S. R. It is doubtful if any large change in the utilization of milk in these two countries has occurred over the last few years—particularly in India.

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Authors of papers intended for publication in Food Technology should request from the Editor's office a copy of a booklet, titled "Suggestions to Authors," and see that their papers are in the form specified therein before they are sent to the editor.

The Institute of Food Technologists assumes no responsibility for statements in contributed articles appearing in Food Technology. Editorials present only opinions of the writers and do not necessarily reflect policies of the Institute of Food Technologists.

Selected Abstracts

ANALYTICAL METHODS

26J. Determination of reduced iron in vitamin enrichment mixtures.

NEUSS, J. D., AND FREDIANI, H. A. *Cereal Chem., 26,* 339-41 (1949).

When iron is present as reduced iron (iron by hydrogen) in vitamin enrichment mixtures it may be determined readily by magnetic separation and direct weighing. Such method provides a rapid and precise method for determining the added iron content and precludes the inclusion of other iron compounds that may be present in the other components of the mixture.

27J. The iodine content of fruits and vegetables.

CAMPBELL, R. B., AND YOUNG, E. G. *Can. J. Res., 27F,* 301-6 (1949).

The content of iodine in fruits and vegetables from the eastern Maritime Provinces has been determined by a modified Pfeiffer procedure. The sensitivity of the method was found to be about 1μgm., with an accuracy of approximately ± 5%. The results obtained were near the mean values previously reported. The iodine content of potatoes varied from about 50 to 400 p.p.b. with a mean value of 153 p.p.b.; that of turnips from 50 to 90; several samples of cabbage, peas and pumpkin showed no trace of iodine present. Most specimens of fruit had no iodine, or only a trace, with the exception of plums which contained 113 p.p.b. No correlation of iodine content with variety or site or origin was evident.

28J. Procedures for the appraisal of the toxicity of chemicals in foods.

LEHMAN, A. J., et al. *Food Drug Cosmetic Law Quart., 4,* 412-34 (1949).

The objective of this paper is to present a discussion of the technics and procedures used in the Division of Pharmacology in attempting to solve the various phases of the problem. These phases may be listed as (1) chemistry, (2) acute toxicity, and mechanism and site of action, (3) allergic responses, (4) subacute and chronic toxicity, reproduction and paired feeding studies, (5) biochemistry, and (6) pathology.

BIOLOGICAL SCIENCES

BIOCHEMISTRY

29J. The copper-catalyzed oxidation of ascorbic acid in fruit and vegetable suspensions.

HUELIN, F. E., AND STEPHENS, I. M. *Aust. F. Sci. Res. B, 1,* 50 (1948); *Food Sci. Abst., 21,* 30 (1949).

The copper-catalyzed oxidation of ascorbic acid was studied in phthalate and phosphate buffers. The rate increased with concentration of copper up to 10 p.p.m., and with increasing pH, up to 6. Oxalic, malic, citric and tannic acids, sulphur dioxide, albumen, cysteine and particularly, thiourea reduced catalysis by copper. Most fruit and vegetable tissues were found to contain substances which reduced the copper-catalyzed oxidation of ascorbic acid onion tissue giving outstanding protection, owing probably to the volatile sulphur compounds associated with pungency. Even in fruit and vegetable suspensions containing protective substances, the effect of low concentrations of copper was still quite appreciable, particularly in the case of tomato products.

30J. The enzymic synthesis and degradation of starch. Part IV. The purification and storage of the Q-enzyme of the potato.

BARKER, S. A., BOURNE, E. J., AND PEAT, S. *J. Chem. Soc.,* 1705-11 (1949).

An improved method is described for the isolation and purification of the Q-enzyme of potatoes. The Q-enzyme prepared by this method effects almost a 90% diminution of the absorption value of amylose with the concomitant liberation of only 2% (as maltose) of reducing end-groups. The preparation is free from α- and β-amylase, maltase, and fatty acids. The amylose-degrading action of Q-enzyme functions at optima of pH 7.0 and temperature 21° ± 1°. Although Q-enzyme is unstable in aqueous solution, it can be stored for long periods without appreciable loss in activity when it is freeze-dried.

31J. The enzymic synthesis and degradation of starch. Part V. The action of Q-enzyme on starch and its components.

BARKER, S. A., BOURNE, E. J., AND PEAT, S. *J. Chem. Soc.,* 1712-17, July, 1949.

The end-product of the action of Q-enzyme on amylose is a red-staining polysaccharide, having a ramified structure and an average chain-length less than that of amylose. This polysaccharide, like that produced from potato starch by Q-enzyme, is indistinguishable from natural amylopectin. The hypothesis of Bourne and Peat (*J. Chem. Soc.,* 1945, 877) that Q-enzyme catalyses the conversion of amylose into amylopectin is substantiated.

32J. Separation of enzymes on the filter paper chromatopile.

MITCHELL, H. K., GORDON, M., AND HASKINS, F. A. *J. Biol. Chem., 180,* 1071-6 (1949).

It has been established that considerable enzyme resolution can be attained by use of the filter paper chromatopile. Variations in salt concentrations and pH are shown to have a great influence on the movement of at least two enzymes in the pile. These variations with the many obvious ones that are yet to be investigated may provide some new criteria for protein homogeneity.

33J. Cysteine protection against X-irradiation.

PATT, H. M., et al. *Science, 110,* 213-14 (1949).

Administration of cysteine, but not cystine, to rats greatly diminished the toxicity of X-irradiation in the nearly completely lethal range. It is proposed that this ameliorating influence resides in the protection against oxidation of certain cell constituents provided by the cysteine. Oxidizing compounds are known to be formed by the action of X-irradiation on water.

34J. Correlation of browning, fluorescence, and amino nitrogen change with destruction of methionine by autoclaving with glucose.

GRAHAM, W. D., PENG, Y. H., AND MCGINNIS, J. *Science, 110,* 217-18 (1949).

A brief paper discussing the work along similar lines by others. The conclusion arrived at is that no marked destruction or changes in brown color, fluorescence, and amino nitrogen was brought about by autoclaving methionine in an 8% glucose solution.

35J. The reaction between milk protein and reducing sugar in the "dry" state.

LEA, C. H. *J. Dairy Res., 15,* 369 (1948); *Food Sci. Abst., 21,* 95 No. 342 (1949).

A progressive loss of free amino-nitrogen, and an approximate corresponding increase in combined sugar, have been found to occur in the undialyzable (protein) fraction of separated milk powder of high moisture content during storage. To investigate whether this is due to a reaction between amino acids and reducing sugars, or whether denaturation of the protein is responsible, "dry" dialyzed milk protein was stored for 6 months at 37° C. and 55% r.h. alone and in presence of small proportions of glucose, of high proportions of lactose and sucrose, and of mixtures of these sugars. The reducing sugar combined with free amino groups of the protein, sucrose did not. The reaction did not proceed to completion, and only when the sugar-amino reaction occurred did discoloration ensue. Glucose reacted with the protein more rapidly than lactose, and the complex formed became discolored and insoluble in water more rapidly. Sucrose and lactose, particularly the latter, greatly delayed the onset of glucose-induced insolubility, but did not prevent discoloration. The protein alone did not discolor, but became insoluble in cold, but not in hot, water after prolonged storage. This change was prevented by sucrose; but the behavior of lactose was variable.

(Continued on page 8 following technical papers)

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In making preserves to sell to the baking industry, the company soaks apricots for 24 hours. The fruit is thus softened and easily macerated, then cooked with sugar and other ingredients to make the preserves. A large quantity of apricots had been bought which had an excellent color but refused to soften in soaking periods as long as 72 hours. The company wanted the color, but couldn't afford the toughness of the fruit—too long a softening period.

"Come on out and talk to us," Vinson told the preserve maker. "And bring some of the apricots."

When the man and his sample apricots arrived, Vinson took him to the biochemical laboratory. After a few minutes conversation the scientist had an inspiration. He plunged the apricots into an enzyme preparation which softened them in less than a quarter hour.

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ALGINATES FOR THE FOOD INDUSTRY

Abstract by Roy C. Stevens of Scottish Seaweed Industry Anonymous article published in *Food Manufacture* **24**, 357 (1949).

The Scottish Seaweed Research Association is attempting to determine whether a major industry can be established in the production of alginate products. To the present time, employment has been on a periodic or limited scale.

The major problem confronting the industry is the development of an economical method of harvesting the weed. No one method can be used in every instance because the varieties of weed in Scotland are both littoral and sub-littoral and are heavier than water. The sub-littoral weed is the more abundant type and the more difficult to harvest. It is on this type that the current experimental work is being carried on.

Various types of mechanical harvesters have been attempted. Those employing rotary discs have shown a tendency toward fouling. The most successful type to date has been one using special grapnels. These may be continuous or discontinuous.

The discontinuous system involves the use of a specially adapted vessel with two special grapnels mounted on two davits operated by a winch. The grapnels are played alternately, one up one down, from opposite sides of the vessel.

The continuous grapnel system is a development of the above system incorporating a conveyor belt in co-operation with a series of specially designed hooks on grapnels. "The rear end of the conveyor is carried over the sea bed on supporting wheels, while the sixteen special hooks travel around the metal framework over which the designers have used a covering of wire mesh. The hooks are arranged to travel faster than the motive unit and are designed to prevent anchoring. The net depresses the weed, and the hooks gather it and convey it to the surface where it is delivered into the hold."

At the present time, the weed is collected by the villagers and air-dried before being sold to the processing company. It is then thoroughly dried by a hot air blast and ground into a coarse powder. It is stored in this form and will remain stable for up to two years, permitting the building up of reserves.

After the powdered weed has been graded, examined and approved, it is treated with alkaline liquors to give the crude extract containing the alginates. This extract is purified and converted to alginic acid from which the various alginate salts are derived.

It is estimated that the industry can be developed to the extent that it will have an annual turnover value of 15 million pounds.—*Commercial Fisheries Abstracts,* November 1949.

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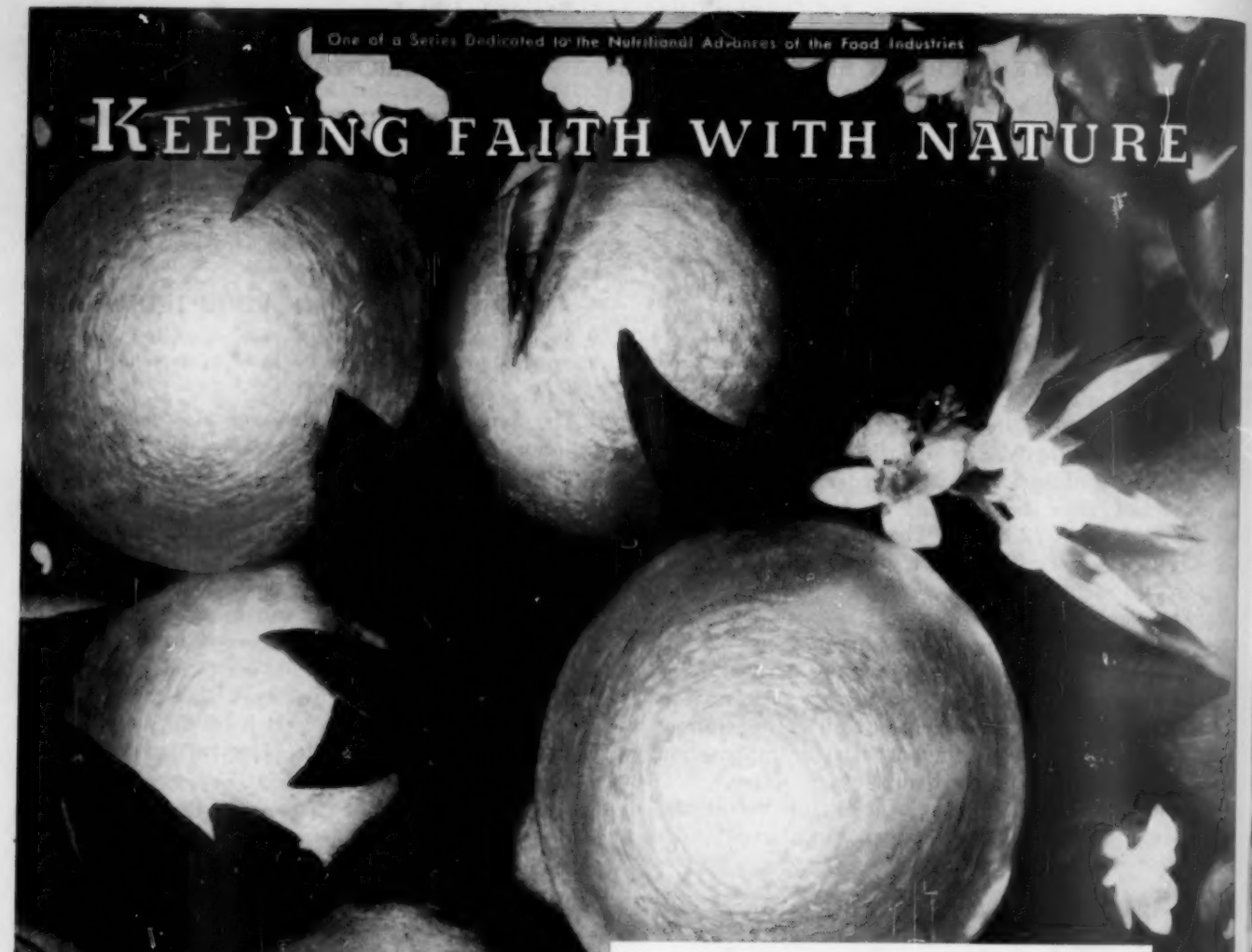

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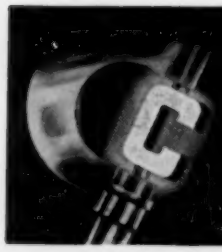

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Abstracts

(Continued from page 5 preceding technical papers)

MICROBIOLOGY

36J. Strain differences in oral lactobacilli and the relation to dental caries.

CLAPPER, W. E., AND HEATHERMAN, M. E. *J. Bact., 58,* 261-8 (1949).

A specific strain of lactobacillus is associated with dental caries. This type produces a pH of less than 5 on glucose, has active dehydrogenase for glucose, ferments saline, mannitol, and rhamnose but not raffinose, and grows rapidly in both.

37J. The electron microscopy of heated bacteria.

HEDEN, C. G., AND WYCKOFF, R. W. G. *J. Bact., 58,* 153-60 (1949).

The protoplasm of young colon bacilli becomes coarsely granular when heated for 10 min. in water at 55° C. or above. In saline, the change takes place at 40° C. and is complete at 50° C. Below this temperature, the change in texture can be reversed by allowing the bacteria to stand overnight in distilled water.

NUTRITION

38J. Milk as sole life diet.

MCCAY, C. M. *Sci. N. L., 56,* 157 (1949).

In tests performed at the New York Agricultural Experiment Station, one group of rats received a diet of cereals, meats and other normal human foods, while another group was fed only cows' milk over a two-year period. The milk was supplemented only with the trace elements manganese, iron, and copper which are lacking in milk. There was no apparent difference between the two groups, including length of life span.

39J. Comparative nutritive value of butter and vegetable fats under conditions of low environmental temperature.

ERSHOFF, B. H., PAGONES, J. N., AND DEUEL, H. J. JR. *Proc. Soc. Exptl. Biol. Med., 70,* 287-90 (1949).

Immature female rats were raised to maturity under cold room and room temperature conditions on purified rations differing only in the source of fat. The fats employed were cottonseed oil, corn oil, margarine fat, and butter fat. Gain in body weight was significantly reduced in all rats under cold room conditions. No significant difference was observed, however, either under cold room or room temperature conditions, in gain in body weight on the various diets employed.

40J. On the probable identity of several unidentified growth factors.

Arch. Biochem., 23, 326-8 (1949).

It appears highly probable that protogen, the pyruvate oxidation factor, and the acetate-replacing factor for *L. casei* are identical. It has been indicated that more than a single form of this factor occurs naturally. Unpublished data show that this factor is also one of the substances which promotes rapid growth of *Streptococcus faecalis* from small inocula in acetate-free media. In confirmation of previous data and in marked contrast to their effect on *L. casei,* concentrates of pyruvate oxidation factor and of protogen were relatively ineffective in replacing acetate for *Lactobacillus arabinosus.*

41J. Occurrence of an unidentified rat growth factor in cottonseed meal.

RUEGAMER, W. R. *Arch. Biochem., 23,* 236-8 (1949).

Hydraulic cottonseed meal contains activity for the rat growth factor. It is not certain whether this activity is due to the presence of vitamin B_{12} or to the existence of some other antithyroid substance in cottonseed meal. Nevertheless, considerable heat is produced in the preparation of hydraulic meal, and it would, therefore, appear that the factor is relatively heat stable. Experiments are now in progress to determine the effect of processing upon the content of this factor in cottonseed meal, and to ascertain the amount present in several composite samples.

42J. Animal protein factor for poultry.

JOHNSON, E. L. *Feedstuffs 21,* 37-9, Sept. 3, 1949.

In experiments at the Iowa Station, the addition of APF (animal protein factor) concentrate to a ration with plant proteins produced chicks which were equal in growth and appearance to those produced by similar rations containing animal proteins. Rations which contain corn, soybean meal, alfalfa meal, minerals and vitamins with APF concentrate during the early growing period will produce excellent chicks. In some experiments where hens were fed rations containing soybean meal as the only protein concentrate, the hatchability of the eggs decreased. Experiments also showed that by replacing part of the soybean meal with condensed fish solubles, fish meal, meat scrap, dried milk or other sources of animal protein, hatchability definitely improved. Growth has been slow and livability poor when soybean meal has been the sole protein concentrate in rations for chicks. Growth and livability were improved by adding the same animal protein feeds which improved hatchability. When there is a deficiency of the animal protein factor in the diet of hens, it shows up clearly in the chick. The egg will not contain the needed nutrients unless the hen receives a balanced ration. Livability during the early growing period is definitely affected by the amount of this animal protein factor contained in the egg. Vitamin B_{12} is definitely related to the animal protein factor. It is known to be at least a part of the animal protein factor, but preliminary research indicates the two are not identical. The greatest contribution which research and the commercial production of this factor may make to poultry feeding is in lowering the price of feed. This may result from reducing the amounts of animal proteins used, a reduction in their price or perhaps a combination of lower price and smaller amounts of animal proteins needed.

43J. The effect of the rice diet on the level of the blood pressure in essential hypertension.

LOOFBOUROW, D. G., GALBRAITH, A. L., AND PALMER, R. S. *New England J. Med., 240,* 910 (1949); *J. Am. Diet. Assn., 25,* 794-5 (1949).

This is a progress report of a study using the rice and fruit diet on clinic patients. It is hoped to determine whether this method of treatment is a practical one for use with ambulatory patients living in their normal surroundings and eating with other members of the family on a regular diet. The total number of patients instructed on the rice diet for nine months was 56. Strict adherers were 16 (28%), moderate adherers were 20 (36%); and delinquents 20 (36%). In the clinical picture, a significant drop in blood pressure occurred in 6 out of the 16 patients who adhered strictly to the diet and in the group of moderate adherers a significant drop occurred in 3 of 20 patients.

44J. Substance in potatoes may aid body to use proteins.

Sci. N. L., 56, 147 (1949).

Young rats doubled their growth rate when the non-protein nitrogenous potato substances were substituted for one-fourth of the wheat protein in their diet. In their report to the First International Congess of Biochemistry in Cambridge, England, the researchers stated that this cannot be explained on the basis of supplying essential amino acids. They believe some unknown mechanism to be involved.

45J. Exceptional nutritive value of peanut meal.

DESCARTES DE GARCIA PAULA, R. *Rev. Quim. ind., 17,* 19-24 (1948); *C. A., 43,* 4395[e] (1949).

The chemical components of 3 typical commercial preparations of peanut flours, from which oil has been removed hydraulically, were water 10.5, 9.6, 9.72%; protein 52.06, 53.45, 57.30%; lipides 8.36, 10.48, 10.25%; sugar 7.7, 9.5, 8.7%; starch 7.6, 8.4%, ...; fiber 5.32, 4.8, 3.68%; ash 4.6, 4.11, 3.56%, vitamin

(Continued on page 10)

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Abstracts

(Continued from page 8)

B_1 500, 440, 340γ%, vitamin B_2 270, 270, 275γ% and niacin 14,500, 12,400, and 10,340γ%. The percentage component of a preparation of peanut butter was: Water 2.05, protein 29.3, lipide 46.54, starch 5.86, sugar and dextrins, 5.88, fiber 2.2, ash 2.08, NaCl 4.0, plus the vitamins B_1, B_2 and niacin in the same concentration as in the flour. The utilization of peanut flour for the enrichment of various native cereals is discussed.

46J. Relation of nutrition to infection in children.

RAWLINGS, J. M. *Am. J. Public Health, 39,* 858-60 (1949).

In a study of 315 children ages 2-17 years, 304 children had some form of chronic infection upon initial examination. They were fed supplements of vitamins A-D, B-complex and C, and in some cases iron and liver, for a minimum of 10 months. Observation and treatment showed 82.9% of the children well, very much improved, or much improved. Where tonsils and adenoids were removed, in addition to vitamin supplements, 90% of the children fell in the above 3 categories. In addition to the significant reduction in infection, there was a reduced number of infections and other retardations.

FOOD PRODUCTS

BAKERY PRODUCTS

47J. Process for compounding and treating dough for baked products.

HENNESSY, J. J. 2,478,099, Aug. 2, 1949.

A process for compounding and treating dough for baked products from an initial quantity of flour without using extraneous ingredients except water, which consists in mixing flour with a quantity of water sufficient to make a dough, washing the starch out from dough with a sufficient quantity of water to make a colloidal suspension of starch in water, hydrolizing the starch grains in suspension for improving the quality of the baked products, removing a sufficient quantity of water from suspension so that the concentrated liquid may be added to dough to make a dough of proper consistency for baking and mixing concentrated liquid with dough in order that the dough contains no extraneous ingredients not originally contained in flour except water.

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DEHYDRATED FOODS

48J. Vacuum dehydration.

HICKMAN, K. C. *Assignor to Distillation Products,* 2,471,325, May 24, 1949.

The dehydration process which comprises exposing water containing material in a frozen state to vacuum over a substantial time interval and under such controlled conditions as to remove therefrom progressively decreasing amounts of water in the form of water vapor, progressively admixing with removed water vapors, the vapors of a normally liquid substance having the property of lowering the freezing point of water, vapors being admixed in such relative amounts as to provide progressively increasing proportions of freezing point lowering vapors in the mixture, progressively condensing admixed vapors to produce a liquid mixture of water and substance and progressively removing liquid mixture while in liquid form.

49J. Process of desiccating orange juice involving freeze drying.

FLOSDORF, E. W. *Assignor to Lyophile-Cryochem Corp.,* 2,471,677, May 31, 1949.

The process of desiccating orange juice which comprises concentrating a proportion of the juice in the liquid state, admixing the resulting concentrated product with a proportion of fresh, unconcentrated juice equal in volume to form about 10% to about 50% of the original volume of the concentrated juice, freezing the resulting admixture and removing water from the frozen product by the use of a high vacuum.

50J. Process of desiccating lemon and lime juices.

FLOSDORF, E. W. *Assignor to Lyophile-Cryochem Corp.,* 2,471,678, May 31, 1949.

In the desiccation of lemon and lime juices by sublimation of water therefrom from the frozen state, the step of adding to the juice before freezing at least about 10%, based on the juice, of a sugar, to prevent the desiccated juice from darkening on storage.

FRUIT AND FRUIT JUICE

51J. "High pressure" apple juice storage used in England.

Food Pack., 30, 29, Oct., 1949.

Seven to eight volumes of CO_2 will prevent apple juice from fermenting and growing mold. Without refrigeration this requires 120 psi equipment, with refrigeration, 60 psi is adequate.

SEA FOOD

52J. Blanching oysters booms demand.

Food Packer, 30, 29, September, 1940.

Standard steaming of oysters to open them results in high flavor losses. Hand opening is too expensive for a canning line, but a quick trip through a boiling water bath opens them with small loss.

53J. Ultra-violet rays for detecting shell in picked crab meat.

ROACH, S. W. *Fisheries Res. Bd. Canada Pac., 79,* 39, July, 1949.

Shells fluoresce in ultraviolet light, which also has bactericidal effect.

News of the Institute

CARL R. FELLERS

President, Institute Food Technologists, 1949-1950

Born in Hastings, Oswego, New York in 1893, he graduated from Mexico Academy, Mexico, New York, later spending five years at Cornell University and receiving his Ph.D. in 1918 from Rutgers. During World War I, he was 1st Lt. in the U.S. Public Health Service. In 1920 Dr. Fellers joined the old Bureau of Chemistry and Soils of the U. S. Department of Agriculture studying botulism, resigning a year later to take up work with

Carl R. Fellers

the Northwest Division of the National Canners Association relative to fish canning. From 1923 to 1926, he was Associate Professor of Food Preservation, University of Washington at Seattle, later going east to the University of Massachusetts to become Research Professor of Horticultural Manufacturers. In 1941 he became Head of the Department of Food Technology.

World War II found Dr. Fellers Post Chemical Officer at Fort Devens, Mass. He then spent 3 years in Australia and the SW Pacific where he organized 3 Quartermaster Subsistence laboratories and served as Chief of Laboratory and Inspection for the Army in the SW Pacific Theater. For his splendid war record he received the Bronze Star, Citation by the Surgeon-General and Commendation Letter. Col. Fellers now is Commanding Officer of the 1224th Organized Reserve, Research and Development Group with headquarters at Springfield, Mass.

Author of some 185 scientific papers, and several patents, he has been an Abstractor of *Chemical Abstracts* since 1926, a member of the Editorial Board of *Food Research* since 1936, technical editor of *Quick Frozen Foods* and an assistant editor of the *Journal of Milk and Food Technology*. In addition to all this and his duties at the University of Massachusetts, he is a director of the Blue Channel Corp. of Beaufort, S. C., and has been consultant for food industries.

Dr. Fellers is a Fellow of the American Public Health Assn. (Chairman, Food and Nutrition Section, 1939), and American Association Advancement of Science; member of the American Chemical Society (Chairman, Agriculture and Food Division, 1948-49), Society American Bacteriologists, American Fisheries Society, American Society Horticultural Science, New York Academy of Science, Sigma Xi (Pres., University Massachusetts Chapter, 1938), Phi Kappa Phi and Phi Lambda Upsilon.

Dr. Fellers found time in 1921 to marry Josephine Sanders, a graduate of the University of Washington. They have eight children: 5 boys and 3 girls. Dr. Fellers' avocations are gardening, fishing and tennis and spending summers at their Cape Cod home at North Eastham.

He is a Founder member of the Institute of Food Technologists, in addition to holding such jobs as Councilor, Chairman of the Northeast Regional Section, National Secretary Treasurer, 1946-1949, and now President 1949-1950.

Regional Section News

PUGET SOUND SECTION

The first meeting of the 1949-50 season was held November 10th in the new, modernistic reception room of Sick's Seattle Brewing and Malting Co. Dr. A. E. Bucholtz, Chief Chemist of Sick's, gave a short talk on brewery operation, after which there was a conducted tour through the brewery and control laboratory.

The following Chairmen of the various committees have been appointed for the 1949-50 season:

Program Committee: T. L. Swenson, Food, Chemical and Research Laboratory, Inc., 1201 East 38th St., Seattle 5, Washington.

Membership Committee: M. E. Stansby, U. S. Fish and Wildlife Service, 2725 Montlake Blvd., Seattle 2, Washington.

Publicity Committee: L. P. Callahan, Libby, McNeill and Libby, P. O. Box 1902, Seattle, Washington.

Auditing Committee: L. Newsome, Continental Can Co., 615 Orchard St., Seattle 8, Washington.

Budget Committee: A. J. King, Fisher Flouring Mills, Harbor Island, Seattle 4, Washington.

Employment Committee: M. Patashnik, Libby, McNeill and Libby, P. O. Box 1902, Seattle 11, Washington.

Other officers of the Section were given in the August issue of FOOD TECHNOLOGY.

SOUTHERN CALIFORNIA SECTION

The 63rd meeting was held in the auditorium of the home economics section of Swift and Company's Los Angeles Refinery. Mr. T. C. Bond gave a talk on the activities of the Swift and Co. Zone Laboratory in Los Angeles. A sound film: "Hidden Hunger" was shown by Mr. Bond prior to his talk.

Swift and Co. donated a Swift's Premium ham as a door prize. F. H. Hunsicker of Continental Can Co. brought home the bacon.

It was announced that the Executive Committee of the Institute had accepted the invitation of this Section to hold the 1954 Annual Meeting in Los Angeles. A chance now to compare the fog of the Bay region with the smog of Los Angeles.

The December meeting, Town Hall style, was held at the Rodger Young Auditorium. Mr. Allen E. Wahlgren of the U. S. Department of Commerce, Mr. M. J. Brown, Los Angeles Chamber of Commerce and Mr. William Border, Market Analyst were leaders in a round table discussion on "Predetermining Consumer Acceptance of New Products." Marsden Burns acted as moderator.

AMES SECTION

The name of this section has now been changed officially to "Ames Section."

The November meeting was held in the Faculty Lounge in the Memorial Union Building following a dinner in the Pine Room. Dr. George F. Stewart, Associate Director, Agricultural Experiment Station, Iowa State College, presented a brief report of the National IFT meeting in San Francisco.

Mr. George Sheehe, Agricultural representative for Iowa's Chain Stores Council, described the function of his organization in determining the marketability of the many commodities in which they have interest.

Following Mr. Sheehe's talk, Dr. Ralph Baker, Economics Department of Iowa State College, addressed the members indicating how much of the consumer's dollar is used in each marketing function.

A revised membership directory of the Section will be published in the near future.

NEW YORK SECTION

Robert S. Goodhart, M.D., Scientific Director of the National Vitamin Foundation, and Physician in Charge of the Lower East Side Nutrition Clinic of the New York City Health Department addressed the Section at the January meeting. Those who had occasion during World War II to do business in the South Agricultural Building in Washington no doubt came in contact with Dr. Goodhart who was Chief of the Industrial Feeding Section of the War Food Administration. Prior to this he was with the U. S. Public Health Service, Assistant Professor of Medicine at New York University, and Fellow at Oxford, Rockefeller Foundation. He received his M.D. at N.Y.U. and Bellevue College of Medicine in 1934.

MOHAWK VALLEY SECTION

The first meeting of the fiscal year was held October 27th at Little Falls on invitation of the Chris Hanson Laboratories. Twenty-one members enjoyed a fine turkey dinner and a discussion by Dr. Ernst Reinecke on the history of the development of rennet.

The following officers were elected:

Chairman: John Fairing.
Vice Chairman: Carl Nordgren.
Recording Secretary and Treasurer: Ruth Goodmote.
Corresponding Secretary: W. F. Phillips.

On November 28th members assembled at the Canajoharie Hotel, Canajoharie, to hear Dean Samuel Prescott, first president of the Institute, tell of "Adventuring in Food Technology," and which covered much of his own personal work in the field.

PERSONNEL

The December 1949 issue of *Citrus Leaves* states that GORDON BEISEL, formerly with Florida Citrus Canners Cooperative at Lake Wales, Florida, is now director of research of the Anaheim (California) plant of Real Gold Citrus Products.

M. S. DUNN, Professor of Chemistry, University of California at Los Angeles, has been appointed one of the associate editors of FOOD TECHNOLOGY.

R. R. FULTON, formerly Senior Fellow of the Mellon Institute of Industrial Research, Director of the Research Kitchen of Armour and Co., has been appointed Food Technologist of Magnus, Mabee and Reynard, Inc., well-known New York and Chicago essential oil house.

WILLIAM L. HALEY, Technical Director of Fisher Flouring Mills, Seattle, Washington, was presented with a Scroll of Honor for his contributions to the advancement of cereal technology in the United States, at the annual meeting of the Northwest Section of the American Association of Cereal Chemists in Tacoma, Washington. Mr. Haley was formerly president of the national organization.

CHARLES G. KING, Scientific Director, The Nutrition Foundation, Inc., New York City, has been elected a member of the Executive Board of the American Public Health Association.

JOHN R. MATCHETT, formerly coordinator of food research at Western Regional Research Laboratory of the Bureau of Agricultural and Industrial Chemistry, Albany, California, has been appointed Assistant Chief of the Bureau. Dr. Matchett is located in Washington, D. C.

GEORGE N. PULLEY, formerly Chief Chemist of Feed Products Laboratories, Inc., Lake Alfred, Florida, is now with the Polk Packing Co., Winter Haven, Florida.

FRANCES OWENS of Laucks Laboratories, Seattle, Washington, has been elected Chairman of the Pacific Northwest Section of the A.A.C.C. for 1949-50.

GEORGE P. WALTON of the Eastern Regional Research Laboratory of the Bureau of Agricultural and Industrial Chemistry, Philadelphia, Pa., is up and about again after receiving painful bruises and a shaking up when an automobile in which he was a passenger became involved in an accident last October in Washington, D. C.

NECROLOGY

GEORGE CORNELL SUPPLEE, B.S., M.S., Ph.D., president of the G. C. Supplee Laboratories, died at his home in Bainbridge, New York, on November 7, at the age of 60 years. A recognized authority in the field of dairy research, his early work was concerned with the role of trace elements in milk and milk products; he collaborated with the National Carbon Co. in developing methods of irradiating milk. In 1936 he received the A.M.A. Billings Medal for his work on riboflavin, and was awarded the Borden Award.

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A. S. B. C. PLANS FOR 1950 ANNUAL MEETING

Plans for the next annual meeting of the American Society of Brewing Chemists were further advanced recently when Philip P. Gray, President of the Society and other members of the Executive Committee met with the Local Arrangements Committee, headed by Mr. Herman K. Rosenbusch, to discuss details of the 1950 Convention which will be held May 7th through May 11th at the Hotel Statler in Detroit.

An interesting technical program is assured. Lenard A. Hunt, Chairman of the Program Committee, is arranging for the presentation of numerous constructive research papers. Reports on the activities of technical sub-committees are being prepared under the auspices of the Technical Committee, R. I. Tenney, Chairman.

Visits to local breweries and manufacturing plants and a trip to the celebrated Ford Greenfield Village are contemplated. A special program of activities for the ladies is being developed and it is expected that the Detroit convention will show a continuation of the trend toward increased attendance of the feminine contingent which was so evident at the New Orleans and other recent meetings.

GRANT TO M. I. T. BY CAMPBELL SOUP CO.

A grant of $1,000,000 to the Massachusetts Institute of Technology by Campbell Soup Company was made public recently by Marshall B. Dalton, chairman of the M. I. T. Development Program. This grant, Mr. Dalton announced, brings the development fund up to a total of $8,800,000.

In reporting the decision of the company to make the grant to M. I. T., Mr. Dalton told M. I. T. alumni at their Mid-Winter dinner that James McGowan, Jr., president of the Company, stated that the grant was for the purpose of supporting the Institute's research program in the fields of Biology and Food Technology and in related scientific and engineering subjects.

"This grant," said Mr. Dalton, "is an impressive example of the growing conviction on the part of industry that it has both an opportunity and an obligation to support basic research and education in the fields of importance to industry.

"The grant of $1,000,000 is one of a group of industrial grants to the Institute now totaling over $4,000,000 under a plan whereby the Institute extends to the companies full opportunities to keep abreast of new developments and trends in science and technology."

The president of the Institute, Dr. James B. Killian, Jr., announced that the Institute had decided, as a part of the M. I. T. Development Program, to construct a new building to house the Departments of Biology and Food Technology. This building will be named in memory of John Thompson Dorrance of the class of 1890 who from 1914 until his death in 1930 was president of Campbell Soup Company.

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Authors of papers intended for publication in Food Technology should request from the Editor's office a copy of a booklet, titled "Suggestions to Authors," and see that their papers are in the form specified therein before they are sent to the editor.

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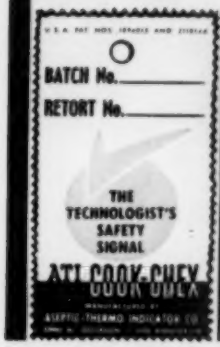

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SPECIAL COURSE AT M. I. T.

A three weeks' special course in food technology, from June 12 to June 30, a feature of the 1950 Summer Session at the Massachusetts Institute of Technology, has been announced by Professor Walter H. Gale, in charge of M. I. T. summer session activities.

To be given under the direction of Dr. Bernard E. Proctor, professor of food technology at the Institute, the intensive course will give particular emphasis to recent developments in food manufacture and control. In addition to lectures, demonstrations, and conferences at M. I. T., there will be opportunities for group visits to representative food industries throughout greater Boston.

The course, intended principally for those having some knowledge of the basic sciences pertinent to food technology, should prove valuable to advanced students in other sciences as well as to executives and employees in food industries, according to Dr. Proctor.

The following subjects are among those on which the course will include fundamental material: economics and statistics of food supplies; food cost accounting and business law; food bacteriology, sanitation, and fermentations; food chemistry and nutrition; materials handling; food control instrumentation; flavor and food acceptance; and food sterilization by electronics. Detailed studies of bakery operations, canning, food freezing, meat packing, milling, and yeast operations will be among several special food processing reports.

In addition to Professor Proctor, the following M. I. T. faculty members will take an active part in the course: Professor William L. Campbell, head of the Department of Food Technology; Dr. William C. Bauer, assistant professor of food technology; Dr. Cecil G. Dunn, associate professor of industrial microbiology; Dr. Robert S. Harris, professor of biochemistry of nutrition; and Dr. Ernest E. Lockhart, assistant professor of food chemistry.

Only a limited enrollment will be accepted, according to Professor Proctor, and preference will be given to those applicants having a background of technical or executive experience in food industries, faculty members of other schools, government workers in food control or nutrition, and advanced students in chemistry and engineering. Letters of application, giving the applicant's experience and background, should be sent to Professor Gale at Room 3-107, M. I. T., Cambridge 39.

Tuition for the three-week course will be $100; academic credit will be given for satisfactory completion of the course only to those who elect to take a final examination.

The special course in food technology is part of a broad program of summer activities at M. I. T., designed to make the Institute's special facilities available to technical and scientific personnel not able to participate in the Institute's regular academic work. All students will have full use of the Institute's dormitory, library, and recreational facilities at nominal cost.

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Selected Abstracts

ANALYTICAL METHODS

54J. A comparative study of ten electrical meters for determining moisture content of wheat.

HLYNKA, I., MARTENS, V., AND ANDERSON, J. A. *Canadian J. Res., 27F,* 382-97 (1949).

Ten electrical moisture meters were tested with 159 samples of Canadian hard red spring wheat, of Grades 1, 2, 3, and 4 Northern, representing a moisture range of 11 to 17%. The two-stage vacuum oven and Brown-Duvel methods were used as bases of comparison. Regression equations, standard errors of estimate, and data on temperature effects are reported. The standard error of estimate of vacuum oven results was 0.15% for the Brown-Duvel method, 0.23% for the Tag-Heppenstall meter, and 0.28% for the Universal meter. Other meters had higher errors of estimate.

55J. Calcium in high-purity sodium salts.

RYNASIEWICZ, J., AND POLLEY, M. E. *Anal. Chem., 21,* 1398-1400 (1949).

As little as 0.1 mg. of calcium can be determined in high-purity NaCl or $NaNO_3$ using 8-hydroxy quinoline at pH 9.5-10.0. This is followed by an oxalate precipitation and titration with 0.01% N $KMnO_4$. This work resulted from checking work of Shuman and Berry who determined that a minimum of 3 mg. of calcium in 20 gm. of salt could be determined by direct precipitation of calcium by oxalate. The authors confirm this value.

BIOLOGICAL SCIENCES

MICROBIOLOGY

56J. Method and device for indicating spoilage.

CLARK, J., D'A. 2,485,566, Oct. 25, 1949.

The method of indicating that a product has been under temperature conditions favoring an appreciable increase of bacteria in or resulting in an appreciable deterioration of such product, comprising placing adjacent to the product a sealed transparent cover containing cold-resistant substantially non-pathogenic bacteria and a simple visual indicator responsive to pH change, which indicator assumes a marked change in appearance to the unaided eye after the ensemble has been subjected to such temperature conditions.

57J. The examination of whole canned foods. I. Examination of swells in low-acid canned foods.

MOLLER, O., AND JUL, M. *Fiskeriminist. Forsogslab. (Copenhagen) Med. No. 81* (1948); *Food Sci. Abst., 21,* 289, No. 1202 (1949).

When examining swells in cans of low-acid food, in order to ascertain whether the blowing was due to leakage or under processing, blown and unblown cans from the same batch should be tested. At least 10 samples should be taken from each group, and the closure of the cans as well as the bacteriol. condition of the contents should be examined. The closure of the cans was tested by (1) measuring the length of the longest (vertical) seam and the variation of this length, (2) measuring the air-tightness of the can, and (3) cutting a triangular section through the seam and stripping the seam to detect faults in the closing process. Examination of the bacterial flora of the can contents was supplemented by a culture test. By this procedure, the cause of the swelling could sometimes be established with certainty. In other cases, where there was doubt, examination of a smaller number of cans or an examination either of the bacteriol. condition or of the can seams alone might lead to erroneous conclusions. Therefore, the cans should be thoroughly tested, as described above. Results of examination of canned prawns, mackerel or tunny in tomato sauce, and mushrooms in different types of can are tabulated.

NUTRITION

58J. The effect of a seafood diet on the red cell count hemoglobin value, and hematocrit of human blood.

WILSON, S. J. *Fishery Leaflet 334,* U. S. Fish and Wildlife Service USDI; *Comm. Fish. Abst., 2,* 11, Sept., 1949.

A diet supplying the major proportion of protein requirement with seafood will maintain the red cell count, volume of packed cells (hematocrit) and hemoglobin content at as high a level as will a free choice diet containing an equivalent amount of protein in the form of meat.

59J. Distribution and nutritive value of the nitrogenous substances in the potato.

CHICK, H., AND SLACK, E. B. *Biochem. J., 45,* 211-21 (1949).

In the variety of potato studied, King Edward grown in the Fenlands, the total nitrogen varied from 1.7-2% on dry wt.; the proportion present as protein varied from about 40 to 50% and was slightly lowered when the potatoes were stored. In the expressed juice of the raw potatoes about 30% of the nitrogen was protein nitrogen: of the non-protein nitrogen about one-fifth was present in free amino-acids, two-fifths in amides and two-fifths in nitrogenous bases. After extraction of the residual pulp with salt solution and alkali, 7-10% of the total nitrogen remained unextracted. At least two soluble proteins were detected in the press juice after deposition of the particles of the starch; one (α-globulin) precipitated from the diluted sap on standing at pH 4, the other (β-globulin) on boiling the filtrate therefrom. In one specimen of freshly dug potatoes the ratio of α- to β- globulin was about 1/2: in a sample of stored potatoes it was about 2/1. Both the nutritive value, judged by capacity to support growth in weanling rats, of the nitrogen in the whole steamed potato and the economy of its utilization, were less than those of the nitrogen in potatoes deprived of the skin and still lower than those of the nitrogen in peeled potatoes from which a layer of 2 mm. thickness had been removed.

The growth-promoting value of the potato nitrogen was usually found to be diminished after storage; the extent of deterioration depended on the conditions, being least after storage at 5°. The ratio of protein to non-protein nitrogen was also lowered after storage.

FOOD PRODUCTS

BAKING AND BAKERY PRODUCTS

60J. Effect of surface-active agents on the softness and rate of staling of bread.

EDELMANN, E. C., AND CATHCART, W. H. *Cereal. Chem., 26,* 345-58 (1949).

The relative effectiveness in bread of 24 different surface-active agents as emulsifiers or "softeners" was determined. The results of compressibility tests and organoleptic examinations made on bread showed that five of the surface-active agents were more effective than the others. They were glyceryl monostearate, glyceryl oleostearate, polyoxyethylene stearate, sorbitan monostearate, and polyoxyethylene sorbitan monostearate.

61J. Packaged food composition.

ARMSTRONG, L., AND WILLOUGHBY, L. B. Assignors to Ballard & Ballard Company, 2,478,618, Aug. 9, 1949.

The method of preparing a dough for distribution which comprises incorporating in the dough at least one of the slow-acting baking acids from the group consisting of sodium acid pyrophosphate and glucono delta lactone in amount greater than that equivalent to 0.775% of CO_2 released thereby from the carbonate (based on the weight of the flour in dough) and a baking carbonate in amount at least equivalent to 0.775% CO_2, packaging the dough in a container adapted to limit expansion of the dough, subjecting the packaged dough to conditions adapted to produced relatively rapid evolution of gas within the dough, and substantially terminating such relatively rapid evolution of gas when the dough has expanded sufficiently to be restrained by the container and when a substantial unexhausted reserve of gas-releasing baking compound and of slow-acting baking acid remains in the dough.

CEREALS AND GRAINS

62J. Production of gun-puffed ready-to-eat food product.

THOMPSON, J. J., AND PLENTY, W. P. Assignors to Kellogg Company, 2,478,438, Aug. 9, 1949.

A process of making a ready-to-eat food product of the breakfast cereal type, which comprises rolling an admixture of at least two different cooked coarse particles of the class cereals and legumes to generally coherent ribbon form, to blend and amalgamate the cooked particles, masticating the rolled material with added moisture to form a plastic mass, shaping the mass to particles of desired size and drying the particles, and thereafter explosively puffing the dried particles.

63J. Prepared food article and method of preparing.

SPENCER, P. L. Assignor to Raytheon Manuf., 2,480,679, Aug. 30, 1949.

A method of preparing popcorn for consumption comprising exposing a husked but unshelled ear of popcorn to electromagnetic wave energy for a time sufficient to evert by explosion at least some of the kernels of the ear.

COFFEE AND CHOCOLATE PRODUCTS

64J. Decaffeinated soluble coffee.

ORNFELT, J. Assignor to American Home Foods, 2,472,121, June 7, 1949.

The process of producing soluble decaffeinated coffee, which comprises forming an aqueous extract of ground roasted coffee beans which contains at least about 40% by weight of soluble coffee solids comprising water-soluble and water-dispersible coffee constituents of beverage value, extracting caffeine therefrom by contact of the aqueous extract with a water-immiscible organic solvent for caffeine, effecting contact of aqueous extract and solvent until at least about 90% by weight of the caffeine has been removed from the aqueous extract, separating the decaffeinated aqueous extract from the caffeine-laden solvent, and freeing of residual organic solvent the aqueous coffee extract decaffeinated by contact with the organic solvent to produce soluble decaffeinated coffee.

65J. Chocolate products.

KEMPF, N. W. Assignors to General Foods Corp., 2,480,935. Sept. 6, 1949.

In a process of making a solidified sweetened chocolate which is non-sticky at temperatures above the m.p. of the cocoa butter from a hot plastic chocolate mix including crystallizable sugar, the steps of forming the plastic mix into the desired shape, then applying moisture to the surface of the mix while still in a hot plastic state to cause some of the sugar in the mix to dissolve in the moisture and form a sugar syrup film on the surface, and then drying the film and cooling to solidify the mix with a thin skin of crystallized sugar bonded to its surface.

DAIRY PRODUCTS

66J. Citric acid esters in cheese.

GOODING, C. M., NEAL, R. H., AND VAHLTEICH, H. W. Assignors to The Best Foods, Inc., 2,485,637, Oct. 25, 1949.

A cheese product comprising butter fat water, water- soluble non-fat milk solids, milk protein and a member of the class consisting of monoalkyl esters of citric acid, monoalkylene esters of citric acid, dialkyl esters of citric acid and dialkylene esters of citric acid.

67J. Stabilization of butter.

MUELLER, W. S. Assignor to the United States of America, 2,472,119, June 7, 1949.

A composition of matter comprising a butter product, and an antioxidative rancidity-retarding and decolorization-retarding stabilizing agent comprising tetrachloro-para-benzoquinone.

DEHYDRATED FOOD

68J. Process of preparing dehydrated mashed potatoes.

KAUFMAN, C. W., BURGESS, H. M., AND HOLLIS, JR., F. Assignors to General Foods Corp., 2,481,122, Sept. 6, 1949.

A process of preparing dehydrated mashed potatoes which comprises cooking the potatoes and draining off any free liquid, whipping the cooked potatoes in the absence of free liquid to thoroughly dissociate and intimately mix the cellular material and form an aerated mash consisting of potato substance having mealy uniform texture with the potato starch and protein homogeneously distributed throughout, forming the mash into filaments, and drying said filaments by circulating air at a temperature within the approximate limits of 180° F. and 280° F. there-through at a rate of the order of 150-300 linear feet per min., thereby setting the filaments substantially in their predried size and producing tubular porous dried shreds.

69J. Starch coating for dehydrated carrots.

West. Can. Pack., 41, 27, Oct., 1949.

A 2.5% solution of laundry starch was sprayed on the dice as they left the blancher.

	Loss of Color (6 mo.)
1—unblanched	91.8
2—blanched	70.2
3—blanched + sulfited	74.5
4—blanched + starch	36.4

Flavor followed loss of color (as carotene).

FATS AND OILS

70J. The effect of added water and antioxidants on the keeping quality of lard.

LIPS, H. J. *Canadian J. Res., 27F,* 373-81 (1949).

Moisture alone had little detrimental effect on lard storage life (time at 90° F. to attain a peroxide oxygen value of 10 ml. of 0.002 N thiosulphate per gm.) except at the highest levels of incorporation (up to 12.8%) but citric acid, lecithin, and α-tocopherol had more stabilizing action in dry lard than in lard containing water. Gum guaiac gave the greatest increase in storage life and citric acid the least. The stabilization varied with the original quality of the lards tested (two wet rendered, two dry rendered and two composite lards) but no segregation of the results according to wet and dry rendering of these lards was possible.

71J. Butylated hydroxyanisole as an antioxidant for animal fats.

KRAYBILL, H. R. et al. *J. Am. Oil Chem. Soc., 26,* 449-53 (1949).

Butlylated hydroxyanisole was found to be most effective as an antioxidant when mixed with propylgallate or hydroquinone and citric acids (AM1F-72). Toxicological tests show material to be safe for human consumption, (use permitted by Meat Inspection Division).

72J. Soybean oil composition and method of preparing same.

NEAL, R. H., GOODING, C. M., AND VAHLTEICH, H. W. Assignors to The Best Foods, Inc., 2,485,631, Oct. 25, 1949.

A composition of matter comprising a significant amount of a deodorized soya bean oil having incorporated therein, as essentially the sole added anti-oxidant and anti-flavor reversion agent, at least one monoester of citric acid, one of said monoesters present being monoisopropyl citrate.

73J. Soybean oil composition and method of preparing same.

GOODING, C. M., VAHLTEICH, H. W., AND NEAL, R. H. Assignors to The Best Foods, Inc., 2,485.633, Oct. 25, 1949.

A food product comprising a signincant amount of soya bean oil having incorporated therein a monoester of citric acid, the amount of said monoester being not more than 0.1% of soya bean oil by weight.

FROZEN FOOD

74J. On the freezing and frozen storage of cake.

MILLER, C., AND BEATTIE, I. E. *J. Home Econ., 41,* 463-4 (1949).

Chocolate cakes and cake batters were prepared under standardized conditions, frozen, and then stored in home freezer at 0° F. After 2- and 14-week storage periods, the average palatability ratings did not differ appreciably from the average ratings of freshly baked cakes. The volume of the baked cakes decreased markedly during storage, the longer the storage period, the greater the decrease. The thawed product, however, was rated only slightly lower than the other cakes. It was concluded that chocolate cake could be frozen as baked cake or batter and stored successfully for short periods without serious deleterious effect on acceptability.

(Continued on page 9 following technical papers)

ALUMINUM FOIL FOR FOOD PROTECTION

A statement by the foremost experts in foil packaging...world's largest producers of Aluminum Foil: Reynolds Metals Company

The primary advantage of aluminum foil for food protection is its high resistance to Moisture-Vapor Transmission—either to prevent dehydration, as in frozen foods, or to exclude moisture as from dehydrated soups. A similarly high degree of impermeability to volatile oils and odors is an important advantage to many products. Exclusion of light rays may be a benefit in some cases.

Typical packages using Reyseal

These advantages, recognized by food technologists, can *always* be achieved in maximum degree by a sufficient thickness of aluminum foil, providing the package can be adequately closed or sealed. The Reynolds Metals Company is foremost in the development of all-aluminum packages—including the versatile Reynolds Pak, a one-piece semi-rigid tray with crimp-on lid.

Practically, however, the factors of expense, availability for automatic wrapping and special sealing requirements often make desirable combinations of aluminum foil with other materials.

Hence there arose the wide field of laminated-foil packagings, in which Reynolds has pioneered. These include aluminum foil laminated to various types of paper and plastic film. "Reyseal" is the trade name given to only one broad classification—an aluminum foil and paper structure which utilizes the wax within the sheet to effect a heat seal at the point at which heat is applied.

Reynolds technical laboratories make elaborate tests to determine the values of different foil and foil-laminated packagings, as compared with other materials, for particular food products. The following is a typical test case:

PRODUCT: A dehydrated soup.

CONDITIONS: Four weeks at 100° F., 90% relative humidity.

MATERIALS: 1. Carton overwrapped with Reyseal "O" and waxed paper applied in a single wrapping operation.
2. Carton overwrap: Reyseal "502."
3. Carton made from Reyseal board.
4. Non-foil carton and liner.

RESULTS: Packages 1, 2 and 3 maintained edibility, good odor, flavor and appearance as long as three weeks, whereas product in package 4 lost flavor and acquired musty odor and taste within a week. Package 1 provided 18 times more protection from moisture gain than package 4; package 2 provided 12 times more protection; package 3, 4 times more.

A commercial use of Reynolds Pak

RECOMMENDATION: Package 1.

Food product packers are invited to submit samples for testing. Address requests to **Reynolds Metals Company,** Richmond 19, Va.

REYNOLDS ALUMINUM

Abstracts

(Continued from page 7 preceding technical papers)

75J. Effect of aging before freezing on beef palatability.
McCoy, D. C. et al. *Refrig. Eng., 57,* 971-4 (1949).

Dehydration losses, drip losses, cooking losses, and total yield do not correlate with the methods of freezing or methods of aging. Flavor of all beef used in this work, regardless of its treatment prior to freezing or the manner in which it was frozen or held in frozen storage, began to deteriorate rather rapidly after a storage period of six months. The flavor of aged beef regardless of the method of aging deteriorates more rapidly than unaged beef in frozen storage. There was some indication that frozen beef became less tender during storage. This change is more apparent in the roasts than in the steaks, possibly due to cooking methods. Differences in the tenderness level of all types of aged and unaged beef were not affected by freezing. However, the difference in tenderness between aged and unaged beef became less with increased frozen storage time. Aging in the presence of ultraviolet light results in no changes in either taste or tenderness of frozen beef which did not occur in the absence of ultraviolet light. The methods of freezing beef used in these tests were not factors contributing to flavor, taste, and tenderness changes which occur in frozen storage.

FRUIT AND VEGETABLES

76J. Storage of fresh citrus.
Refrig. Res. Found., 49-9, *5,* Sept. 20, 1949.

Definite recommendations can now be made, based on two years of work by leaders of this project. Texas and Florida Valencias harvested before they are overmature, wrap-packed in standard boxes and held at 32° F. with r.h. of 85% can be expected to keep for as long as 3 to 4 months. Decay has not averaged more than 5% for this period and flavor has been well preserved. Use without excessive delay following removal from cold storage is necessary. Frequent inspection is advisable. Rind defects vs. decay has been a problem for lemons, and recent commercial experience has indicated that the higher temperature (45°-60° F.) that avoids rind injury is not always to be preferred over 32° F., which protects against decay but does permit development of rind defects.

77J. The Krebser process.
Faure, A., and Chouard, M. *Rev. gen. Froid, 25,* 495 (1948); *Food Sci. Abst., 21,* 159, No. 619 (1949).

The "Krebser" process, is based on the properties of the moss *Hyphum triquetrum,* and was developed and patented in Switzerland about 1942. The living moss (1) can regulate, within certain limits, the humidity of the atmosphere in the store, (2) can absorb ethylene and aldehydes, and (3) under certain conditions, can provide some cooling, owing to its large evaporation surface. The paper then deals with the technic of the "Krebser" process for the storage of fruit, showing by means of a diagram the principle of a Krebser installation, including the system of ventilation. It gives an account of experiments carried out in France to investigate the actual ability of the moss to regulate humidity, cool the air, and absorb volatile products (ethyl aldehyde, ethylene, and ammonia or ammoniacal vapours) in fruit storage rooms. The living moss also appears to have a retarding effect on the growth of fungi (e.g. Penicillia) which attack fruit. The Krebser process can be used either in fruit cellars or in mechanically refrigerated cold stores.

78J. The phytotoxicity of D. D. T. and of benzene hexachloride.
Stocker, R. I. *Ann. appl. Biol., 35,* 110 (1948); *Food Sci. Abst., 21,* 110, No. 411 (1949).

Results of spraying tests are reported. The flavor of potatoes, peas, carrots, beetroot, marrows, cauliflower and lettuce were tainted by a spray compounded from benzene hexachloride dispersible powder; apples and plums so treated developed a taint after cooking.

PECTIN—JAMS AND JELLIES

79J. Grading pectin in sugar jellies.
Bender, W. A. *Anal. Chem., 21,* 408-14 (1949).

The method is founded on the straight-line relation between the strength of a jelly and the pectin concentration, when the strength is measured as the breaking point of slices of jelly. The measurements are made with the Tarr-Baker gelometer, calibrated to obtain precise results. The method is general in that the suggested standard may be changed, or grades may be determined under any combination of the adjustable factors of jelly making.

80J. The pectic enzymes of the mold Byssochlamys fulva.
Beaven, G. H., and Brown, F. *Biochem. J., 45,* 221-3 (1949).

The enzyme system produced by the mold *Byssochlamys fulva* has been examined. Evidence has been found for the presence of protopectinase and a disaggregating enzyme which reduces the molecular size of pectin without the production of galacturonic acid. The production by a fungus of a pectinase type of enzyme which is free from pectin methoxylase has not been reported hitherto.

ELASTICITY OF CONNECTIVE TISSUE AND QUICK DETERMINATION OF CONNECTIVE TISSUE IN MEAT

Abstract by Maurice E. Stansby of the Fishery Technological Laboratory, Fish and Wildlife Service, Seattle, Washington. Article by E .C. Bate Smith published in Report of the Food Investigation Board (Great Britain) for the Year 1939, **7** (1949).

Experiments on the elasticity of collagen fibres (a factor related to increase in tenderness of meat during aging) are described and the data treated mathematically. The elastic extension and recovery do not follow Hooke's law; rather, they vary according to the square root of the applied load. Elasticity of collagen fibres increases by as much as 60 percent during storage and this increase is related to an increase in tenderness.

In extracting soluble proteins from muscle, the shortest extraction period is obtained by using very finely ground muscle. Best grinding of muscle is obtained if it is first dried. Ordinary air drying gives a horny mass from which much of the protein can not be extracted. A high-vacuum drying technic has been devised which yields a dried muscle powder of such high degree of subdivision that extremely rapid extraction of soluble protein is attained and results are identical with those obtained on fresh, undried muscle. The muscle is minced, mixed, and a thin layer is spread on a watch glass over phosphorus pentoxide in a vacuum desiccator, evacuated with a high-vacuum pump and the muscle dried to constant weight. It is then ground to a fine powder in a coffee mill and 1-gram samples of the thoroughly mixed powder are shaken with 150 ml. extractant for one hour in a centrifuge tube. The solid is centrifuged and shaken again with fresh extractant. The extracts are combined and protein nitrogen determined on an aliquot.

Connective tissue nitrogen is calculated as the difference between total protein nitrogen and hydrochloric acid extracted nitrogen (determined as above).—*Commercial Fisheries Abstracts,* December 1949.

News of the Institute

HONORS

Thomas M. Rector, Appert Medalist

Mr. Charles L. Smith, Chairman of the Nicholas Appert Award Jury of the Chicago Section of the Institute of Food Technologists has announced that Mr. Thomas M. Rector, Vice President of General Foods Corporation, New York City, and Chairman of the Panel on Food, Committee on Equipment and Materials, Research and Development Board, Washington, D. C., has been selected as the Nicholas Appert Medalist for 1950 and will be awarded the medal at the Decennial Conference of the Institute at the annual banquet on the evening of May 23rd, 1950, at the Edgewater Beach Hotel in Chicago.

Regional Section News

SOUTHERN CALIFORNIA SECTION

The January meeting of the Section was held as a luncheon at Hostess House, Helms Bakery in Los Angeles. Earl B. Cox, Vice President, addressed the luncheon group on operations of the bakery. Following the luncheon, there was a tour of the bakery under the auspices of Jane Sterling, director of Helms Consumer Service.

The fourth annual all-day conference of the Section was held on February 17th at the Mayfair Hotel in Los Angeles. The general theme of the meeting was "New Product Development," speakers being M. J. Copley, Director of the Western Regional Laboratory of the Bureau of Agricultural and Industrial Chemistry, Albany, Calif.; Sven Lassen, Director of Research, Van Camps Seafood Co.; E. W. Sann, Director of Sales, Industrial Chemicals Dept., Atlas Powder Co.; Paul F. Sharp, Director California Agricultural Experiment Station, University of California, Berkeley. The dinner speaker was Walter S. Jensen, manager of the Railroad Perishable Inspection Agency, New York City, whose topic was "A Scientific Approach to Food Transportation."

Through the courtesy of the California and Hawaiian Sugar Refining Corp. Ltd., a colored movie "Kopa-A" was viewed by members of the Section.

NORTHERN CALIFORNIA SECTION

This Section's "Hornblower" is going to have another toot. The future of the "Hornblower" has been given into the hands of the San Jose contingent of the Section. Originally established to bally-hoo the National Convention held in California in 1949, the "Hornblower" served its purpose well under the leadership of Walt Richert. The "Hornblower" has not stopped blowing, and it is hoped that the publication will become a desirable and permanent member of the Northern Section.

PHILADELPHIA SECTION

The January meeting was held at Brewery Tavern on the 19th. Following the dinner, J. J. Willaman, Chief of Division of Biochemistry, Eastern Regional Research Laboratory, Bureau of Agricultural and Industrial Chemistry, spoke on "Enzymes: Pure and Simple."

CHICAGO SECTION

More About 1950 Conference. Dr. Lloyd A. Hall, National Program Chairman for the 1950 Decennial IFT Conference to be held at the Edgewater Beach Hotel in Chicago beginning May 21st, has really selected a bevy of outstanding speakers. Look over the list. There will be Martin H. Kennelly, Mayor of Chicago; Dr. Ernest H. Volweiler, Executive Vice President, Abbott Laboratories and President of the American Chemical Society; Guy E. Reed, Vice President, Harris Trust and Savings Bank, Chicago; Dr. Henry T. Heald, President, Illinois Institute Technology; Dr. E. B. Hart, University of Wisconsin; Dr. C. G. King, Nutrition Foundation; Allan B. Kline, President, American Farm Bureau; Dr. Leverett Lyon, Chief Executive Officer, Chicago Association of Commerce and Industry, formerly Vice President, of Brookings Institute.

Dr. Carl R. Fellers, President of IFT will give the President's message.

One of the interesting and unusual features of the Conference is the Executives' Luncheon Tuesday, May 23rd., the purpose of which is the creation of a broader appreciation of the significant role food technologists have already assumed and are prepared to extend in the future development of food industries and national economy. Invitations for the luncheon will be extended to outstanding leaders in finance and industry.

The ladies have not been forgotten. There will be a social hour on Sunday May 21st; there will be a sight seeing tour of the city, Tribune plant, Sears, Roebuck, Palmer House, meat packing and ice cream plants, candy kitchen, Marshall Field (includes luncheon and fashion show), and radio programs.

Details of the Conference were published in the February issue of Food Technology.

OHIO VALLEY SECTION

The Section met in an all-day session on February 11th, starting with an Executive Committee meeting. The afternoon technical program consisted of the following papers:

"Flavor Evaluation of Processed Fruits and Vegetables Sprayed with Organic Pesticides." W. A. Gould, Dorothy Culler and Margaret Dunnigan, Dept. Horticulture.

"Statistical Study of Taste Panel Data." Fred Krantz, W. A. Gould and Margaret Dunnigan, Dept. Horticulture.

"Taste Evaluation of Fruit Juice Blends and Concentrates." H. D. Brown and Richard Barton, Dept. Horticulture.

"Some Biochemical Changes Related to the Flavor of Cheddar Cheese." W. J. Harper, Dept. Dairy Technology.

"Studies on the Nature of Tenderness in Fresh Meat." L. E. Kunkle and Robert Deans (Dept. Animal Husbandry), and F. E. Deatherage, S. A. Husaini and H. D. Draudt (Dept. of Agriculture Biochemistry).

"The Effect of Excess Lime Treatment on Certain Bacteria that may be Present in Water Supplies." H. H. Weiser and Thelma Rheins (Dept. Bacteriology); M. W. Riehl

and F. H. Waring (Ohio Dept. Health); C. P. Hoover (Columbus Water Purification Plant).

"Recent Developments in Evaporation Engineering." Joseph A. Cross, Majonnier Bros. Co.

During the afternoon there was a tea with the School of Home Economics and Professor Inez Prudent.

At 6:00 P. M., dinner at the Faculty Club and Dean Leo L. Rummell, College of Agriculture, Ohio State University, and Director, Ohio Agricultural Experiment Station as speaker of the evening.

NEW YORK SECTION

A dinner meeting was held on February 15th which included a "Forum on Food Laws." Those participating in the forum were Thomas Rector, Vice President, General Foods; Charles W. Crawford, Deputy Commissioner of Food and Drug Administration, and Charles W. Dunn, President of the Food Law Institute.

PERSONNEL

E. A. Beavens and R. J. McCulloch appeared with Rolly Langley on a television program sponsored by IFT on Channel 9, KFI-TV, Los Angeles on the afternoon of December 15th.

Clifford L. Bedford, formerly Assistant Professor at the State College of Washington, Pullman, has been appointed food technologist in the Department of Horticulture, Michigan State College.

L. E. Clifcorn has been elected Chairman of the Division of Agricultural and Food Chemistry, American Chemical Society, succeeding Carl R. Fellers.

Charles W. Kaufman, Director of Research and Development, General Foods Corp., with his family are in England for a visit of some months. Dr. Kaufman is combining business and pleasure, but it's going to be all pleasure for his family.

Arie J. Haagen-Smit, Professor of Bio-organic Chemistry, California Institute of Technology, will be presented with the Fritzsche Award, sponsored by Fritsche Brothers, Inc., essential oils and aromatic chemicals, New York City, at the spring meeting of the American Chemical Society.

Russell S. McBride now has associated with him in his consulting chemical engineering practice, John T. Cox, Jr., who has resigned as deputy director of the Office of Rubber Reserve, Reconstruction Finance Corporation.

Roy C. Newton, past president of IFT, commutes from Chicago in his own Cub Airplane to his farm at Three Rivers, Michigan. If you don't believe, it, see *This Week Magazine* for January 15th for all the details, along with photos of Dr. and Mrs. Newton and recipes for Mrs. Newton's "Crumb Cake," "Roll Cookies" and "Sour Cream Spice." The whole story is in a special article by Clemetine Paddleford, Food Editor for *This Week*.

On December 10, 1949, Everett Meschter and Doris Winder were married at the Carmel Presbyterian Church, Glenside, Penn. The bride and groom spent their honeymoon in Bermuda and the Bahamas.

George P. Walton has retired after 44 years of a distinguished career with the Federal Government. He started his service in the Patent Office in 1905, transferring two years later to the old Bureau of Chemistry then headed by Harvey W. Wiley, father of the Food and Drug Act. Mr. Walton's 42 years in the U. S. Department of Agriculture were marked by research in a wide variety of agricultural research, and during the past 10 years he spent most of his time on problems dealing with honey. He plans to live in Washington in the home on 33rd Street, N. W. that he and Mrs. Walton established when they were married in 1912.

BLANCHING OYSTERS BOOMS DEMAND

Abstract by Roy C. Stevens of Scottish Seaweed Industry.
Anonymous Article published in *Food Packer* 30, No. 10, 29 (September, 1949).

A Seattle company, by means of its new blanching process of preparing oysters for canning, has increased consumer demand for its product which more than compensates for the greater cost. The company handles about 80% of the Pacific Coast pack in its cannery at South Bend, Washington. It takes its oysters from 16,000 acres of beds in that area, operates eleven opening plants and buys the output of twelve others.

Harvesting of the oysters is done by suction dredges which lift 20,000 gallons of water and muck per minute through two 20-inch pumps. The oysters fall onto a screen conveyor which carries them to the deck of the dredge. The shells were formerly opened by placing them under live steam until they opened and the meat could be lifted out.

This steam-opening method is much cheaper than the fresh-opening process, but it results in the loss of nectar, flavor and much of the food value. Because oysters are canned on a mass production basis, which makes hand-opening impossible, the company sought a method of opening them quickly while retaining all the advantages of the slower hand process.

In the blanching process the oysters are placed in a hot water bath for 30 to 60 seconds. The water is kept at 212° by live steam introduced through jets. This temperature is not hot enough to cook the oysters but is sufficient to open the shells. By this method the nectar loss is held to only 5 to 10 percent, the food value of the meat is retained and the flavor is fixed. Under the old method of opening the shells, the canned product had lost about 50 percent of its nectar.

The president of the firm states that this method has increased production costs by $1.12 per case of forty-eight 10-ounce cans over the former steam opening process, but that this greater cost has been more than made up by improved consumer demand.

After the oysters have been removed from the shell they are washed and graded, with the small, or sea, size set aside for fresh packing. The choice oysters are again graded as they go into the cans. Cooking is done at 240° with live steam under 10 pounds pressure for 30 minutes.

Commercial Fisheries Abstracts, January 1950.

Book Review

FOOD POISONING by G. M. Dack, Ph.D., M.D., Second Edition Revised. The University of Chicago Press. 1949. 184 pages. Price $3.75.

This small text, prepared by an authority in the field, has been generally recognized as one of the best and most complete treatises available on the subject of food poisoning and food infections. The popularity of the first edition made it mandatory that a second edition would be prepared which would include a digest of the experiences in this field during World War II. Accordingly it is up-to-date with references to the literature through 1948.

The book contains nine chapters and deals with chemical poisons in foods; poisonous plants and animals; botulism; staphylococcus food poisoning; the Salmonella group of organisms in relation to food-borne disease; Streptococcus fecalis food-borne infections; and other bacteria that have been suspected in food-borne outbreaks of disease. Included in this last group are E. coli, Proteus vulgaris, Proteus mirabilis, the Aerobacter group, the paracolon organisms and Clostridium welchii.

The final chapter deals with infections that are to be differentiated from food poisoning and includes the Shigella group of organisms, infectious hepatitis, amebic dysentery, trichinosis and epidemics of acute digestive upsets of virus or of unknown etiology. There is no discussion however of outbreaks of infant diarrhea in hospitals and their possible relationship to infected food, or of food-borne outbreaks of typhoid fever which have at times been very significant from a public health standpoint.

The text will undoubtedly be widely used by bacteriologists, by public health workers and by all who are professionally interested in the control and prevention of food-borne outbreaks of disease. It is a text that can be highly recommended for its basic information, for its sound and clear presentation of an important subject and for the numerous references to the scientific literature.

M. P. HORWOOD.

VITAMINOLOGY—THE CHEMISTRY AND FUNCTION OF THE VITAMINS, by Walter H. Eddy, Ph.D. Emeritus Professor of Physiological Chemistry, Columbia University. The Williams and Wilkins Company, Baltimore, Md. 1949. 365 pages. Price $6.00.

Many Food Technologists have a frequent or occasional need for a reference to up-to-date literature concerning some aspect of our present knowledge of the vitamins. Here is such a book. However, one should be cautioned that this book does not present methods of vitamin assay and determination.

Dr. Eddy is not only a leading authority in the field of biochemistry but is also a veteran writer in his field. His book shows this in the clear organization of the broad subject of the chemistry and functions of all the known vitamins.

The book is replete with carefully selected references and is written more in the style of a literature review than is a text that is intended to be read from cover to cover.

The introductory chapter has a short treatment of "What is a Vitamin?" In this chapter the author states that the present bibliography of vitamin research has become so extensive in each vitamin field as to make impossible complete presentation of contributions or credit to contributors. The papers selected are primarily to lead the student to the problems and make no pretense to complete coverage of any field. I might add that much valuable reference material is included for one who wishes to find the chemical formulation of the vitamins, present concept of human requirements or the physiological functions. Dr. Eddy stresses what functions appear to be established, what have been suggested, and what remain for further investigation.

There are nineteen chapters and an excellent index which enhances the use of the book. Naturally, the better known and well established vitamins receive considerable detailed treatment in the text. Thus, a chapter each is devoted to vitamins A, D, E, and K.

Chapter 6 is a short one introducing the Water-Soluble Vitamins. This is followed by a chapter on each of the vitamins that come under this heading: Thiamine, Riboflavin, Pyridoxine, Niacin, Pantothenic Acid or Pantothen, Inositol, Para-amino-benzoic Acid or Paba, Biotin, Choline, Folic Acid or the Pteroylglutamates and Ascorbic Acid.

The latter chapter contains some brief mention of the use of Ascorbic Acid (Vitamin C) as an antioxidant to prevent color changes and off flavor in food products. Chapter 18 deals with the group classified as Vitamins P such as Citrin and Rutin. In the summary to this chapter the author states that to date there is no satisfactory evidence that vitamins P are dietary essentials for either man or animals although they may be of value as pharmacologicals in the treatment of capillary fragility.

The last chapter in this book is entitled "Some Other Postulated Vitamins" and deals briefly with the Animal Protein Factor (B_{12}), Lactation Factors L_1 and L_2, Summer Butter Factor, Vitamin B_{14}, Vitamin T. This chapter is only seven pages long. With the vast amount of progress being made by qualified workers in the field of human nutrition and with constant improvement of methods and technics, it is entirely possible that these lesser known and postulated vitamins will warrant greater coverage in the near future. That chance does not lessen the value of this book nor should it deter anyone from publishing a summary of present knowledge to be used as a tool and reference by so many in such a broad field. It is to Dr. Eddy's credit that he has been conservative enough to select reliable references, particularly for the postulated factors and lesser known vitamins.

ARTHUR S. LEVINE.

ROSE'S LABORATORY HANDBOOK FOR DIETETICS, Fifth Edition, Revised and Rewritten by Clara Mae Taylor and Grace MacLeod. The Macmillan Company, New York, 1949. 358 pages. Price $5.50.

Dietitians and all others faced with the problem of computing the food requirements of different individuals and of calculating the contributions which different foods make to the diet will welcome the new edition of this widely used handbook. The previous edition of 1937 has been ably revised and rewritten by Clara Mae Taylor and Grace MacLeod.

As in the earlier edition, many conversion tables are included, which are useful in all the types of calculations encountered in planning dietaries. Amounts of refuse present in a number of foods are given, and extensive tables are included as formerly giving nutritive values of foods in "shares."

Almost one hundred pages are devoted to tables giving the protein, fat, carbohydrate and calorie values in 100 grams, 1 ounce and 1 pound of a large number of foods. An additional fifty pages give similar information concerning the calcium, iron, vitamin A, thiamine, ascorbic acid, and riboflavin values of common foods. Further tables give amounts of other minerals (magnesium, potassium, sodium, phosphorus, chlorine, sulfur, and iodine) in foods.

Of special interest are tables giving the amounts of ten essential amino acids in single proteins, in mixed proteins and in foods, and tables giving niacin, biotin, pantothenic acid, para-aminobenzoic acid and pyridine contents of foods and vitamin D in fish liver oils and in foods.

Included also are tables giving the excess acid or base in 100 gram and 100 calorie portions of a variety of foods, and the oxalic acid content of certain foods.

The discussion of the functions of various nutrients has been brought up-to-date and a chapter has been added on vitamin losses in the cooking of foods.

JEAN I. SIMPSON.

NUTRITIONAL DATA, compiled by Harold A. Wooster, Jr. and Fred C. Blanck. H. J. Heinz Co., Pittsburgh, Pa. 1949. 114 pages. Distributed gratis.

This book supersedes "Nutritional Charts for Medical and Other Specialists," twelve editions of which have been published since 1934. It differs from its predecessor in format and arrangement as well as in content. Designed to serve as a handy reference on nutrients and their occurrence in foods, the book represents a compilation of data from a great many sources.

The value of such a work is to a large degree dependent upon arrangement of the material. An excellent job has been done in this respect. The subject matter has been placed under eleven main headings: vitamins, the essential elements, proteins and amino acids, the availability of nutrients, signs and symptoms of malnutrition, the metabolism and actions of foods, human nutritive requirements, planning diets for good nutrition, tables of food composition and nutritive value, nutritional activities of H. J. Heinz Co., and suggestions for further reading. Each of these sections is further divided and, in some cases, subdivided; for example, the section on vitamins includes discussions on interpretation of deficiency signs and symptoms, fat-soluble vitamins, water-soluble vitamins, vitamin units and vitamin assay methods. Each vitamin is described in terms of its structural formula, nomenclature, chemical and physical properties, positive functions, deficiency signs, and dietary sources. Other nutrients receive equally complete but concise treatment. Numerous literature citations serve not only to document the sources of data but also provide a guide to further reading on various subjects. The up-to-date nature of the information is indicated by many references to papers published in 1948 and 1949.

In the reviewer's opinion it is unfortunate that the sub-section on conservation of nutritive value of foods does not include a more complete discussion of the degree to which nutritive properties may be lost or retained during processing, storage, and preparation. A statement is made which implies that canned foods may be stored at high temperatures with little loss of vitamin content. Recent work has shown that this is not always true.

Data for the tables on food composition were obtained by averaging values from several sources which in turn represented averages of values taken from the original literature. For the sake of clarity, these single average values have been used rather than a range of values. The authors point out that the figures should be regarded as estimates of composition and not as exact values. Despite this warning, it is likely that some persons will attempt to read into the data a significance which does not exist. For example, when analyses of a food in both the fresh and canned state are given, it might be expected that any differences between them would reflect the effect of the canning process. However, in these tables there are examples where canned foods are shown to differ from their fresh counterparts in a manner which is likely caused by differences in sampling and analytical techniques as well as processing treatment.

Intended primarily for persons engaged in the field of nutrition, the book should be in the hands of all who exercise a degree of control over the nutritive value of our diets by formulating or improving food products and processes.

P. E. RAMSTAD.

BANANAS, by Harry W. von Loesecke. Published by Interscience Publishers, Inc., 215 Fourth Avenue, New York 3, New York. 1949. 189 pages, 5¾ x 8¾ inches. Cloth. Price $4.50.

This book is Volume I of the Economic Series, and represents a quite complete and comprehensive survey of the chemistry, physiology and technology of bananas. As a text, it would definitely be at the college level. Several chapters, however, should interest secondary schools as well as food people who deal with bananas as such as preparations containing the fruit.

The following chapter headings indicate the broad scope of the book:

1. History and Growth of the Trade
2. Structure and Development
3. Commercial Storage and Ripening Methods
4. Chemical Changes During Ripening (51 pages)
5. Transportation of Bananas
6. Banana Products

7. Nutritive Value in Health and Disease
8. Diseases and Insect Pests of Bananas
9. World Banana Production and Trade.

There are good author and subject indexes, and numerous photographs help much to enliven the text. This book will supply the basic researcher or technologist with a broad, well-annotated coverage on bananas.

A. A. SCHAAL.

OUTLINES OF BIOCHEMISTRY, by Ross Aiken Gortner. Third Edition, edited by Ross Aiken Gortner, Jr. and Willis Alway Gortner. John Wiley and Sons, Inc., New York. Chapman and Hall, Limited, London. 1949. 1078 pages. Price $7.50.

This well known textbook on biochemistry by Ross Aiken Gortner, late chief of the Division of Agricultural Biochemistry at the University of Minnesota, has been revised by ten authors most of whom were colleagues or former students of Dr. Gortner. The revision has been edited by Dr. Gortner's sons, Ross Aiken Gortner, Jr., Professor of Biochemistry, Wesleyan University, and Willis Alway Gortner, Head, Department of Chemistry, Pineapple Research Institute, Honolulu, who have also revised certain chapters in the book.

Although this new edition has been thoroughly revised and brought up to date the general outline of the book has been retained. New chapters have been added on Protein Denaturation, Carbohydrate Metabolism and Lipid Metabolism. The book is divided into six sections.

The first section on Colloids has been revised by Henry B. Bull and David R. Briggs. It has been condensed and shortened by 74 pages. The chapter on Osmotic Pressure and Electrical Conductivity has been omitted. Besides considering the colloidal state many phases of biophysical chemistry are covered in this section, such as hydrogen-ion concentration, oxidation-reduction, electro-kinetic phenomena and the Gibbs-Donnan equilibrium.

The second section on Proteins has been revised by W. M. Sandstrom and Ross A. Gortner, Jr. The former has revised the chapters on the general aspects of protein chemistry and the latter the chapters on Protein Metabolism, Biological Reactions of Proteins and Nitrogen Bases. A new chapter on Protein Denaturation by Henry B. Bull has been added. The chapter on Protein Metabolism has been enlarged and includes much of the new work with isotopes.

The third section on Carbohydrates and Related Compounds has been revised by several authors. William F. Geddes has revised the chapters on the chemistry of the carbohydrates, glucosides and saponins. Paul D. Boyer has contributed a new chapter on Carbohydrate Metabolism. J. J. Willaman has revised his chapter on Pectic Substances. The chapter on Lignin and the Tannins has been revised by Samuel I. Aronovsky.

The fourth section on Lipids and the Essential Oils has been revised by Willis A. Gortner. A new chapter on Lipid Metabolism has been added to this section.

The fifth section on Plant Pigments has been revised by George O. Burr.

The sixth section on Biochemical Regulators includes chapters on Vitamins, Hormones and Enzymes. The chapter on Vitamins was revised by Willis A. Gortner, that on Hormones by Ross A. Gortner, Jr. and the one on Enzymes by W. M. Sandstrom.

From the above outline of the book it is obvious that most of the important phases of biochemistry are covered. The text is thoroughly documented with numerous references which should be useful to those wishing to investigate subjects in more detail. The sections on Colloids, Proteins, and Carbohydrates and Related Compounds are sufficiently comprehensive to serve as texts for courses in these subjects at the graduate level.

In the present edition more emphasis has been placed on metabolism which will be welcomed by medical biochemists. Although the book contains much of interest to the medical biochemist, it should be noted that many subjects emphasized in courses for medical students are mentioned only briefly or are omitted. The reviewer has in mind such subjects as foods and nutrition, mineral metabolism, calorimetry, antibiotics, blood and urine.

The reviewer was impressed with the general appearance of the book. The publishers should be complimented on an excellent job of printing. The editors and authors should also be complimented for the scarcity of errors which so often accompany the first printing of a book. Of the few errors found, might be mentioned the omission of an H atom in the formula for D-Galactonolactone on page 539. In discussing Willaman and Morrow's diagram showing the configurational relationships of the aldose sugars on page 530, line 10 should read "secondary" instead of "primary" alcohol group. On page 403 the formula for chondroitin sulfuric acid differs from those found in other books. It would appear that the author has altered the original formula to conform to modern concepts of carbohydrate structure.

The most serious errors of fact which the reviewer has found appear on page 803 and have been carried over from the previous edition. The definitions for the Reichert-Meissl and Polenske numbers are incorrect. The former should read "volatile-soluble" instead of "volatile" acids. The latter should read "volatile-insoluble" instead of "non-volatile" fatty acids.

This book is a real contribution to the science of biochemistry and should find wide use as a text for advanced courses in the subject. It should also prove a very useful source of information for any worker in chemical and biological fields.

ARTHUR K. ANDERSON.

OUTLINES OF FOOD TECHNOLOGY, by Harry W. von Loesecke (Second edition). Reinhold Publishing Corporation, New York, 1949. 540 pages. Price $7.50.

This is a very comprehensive book of 15 chapters. Separate chapters cover fruits and their products, preservation of vegetables, dairy products, meat and meat products, fish and shellfish, grains and their products, nuts, beverages, confectionery products, and spices. Other chapters are devoted to more general subjects as sugars and starches, edible fats and oils, storage and marketing, containers, and preservation by freezing.

This is a book to be studied rather than to be read lightly. Its numerous divisions and subdivisions with footnote references slows the reader to a pace that the contents can be easily digested. It is fairly heavy reading and each chapter begins with an appetizer of verse, philosophy and history, which leads immediately into the subject at hand. By the time the reader has refreshed a few technical phrases, scanned some tables and diagrams, and reached the end of the chapter, he is ready for a pause before entering the next chapter. The book is so written that any chapter is a complete unit within itself, and may be studied without regard to earlier or later chapters. Even the numbering of the text references, of which there are 549, begins anew with each chapter. Besides the text references, there are a total of 278 unnumbered suggested reading references. These readings under the respective subjects are listed at the end of the chapters.

Perhaps nowhere are the difficulties of writing a text book on food technology better illustrated than in the chapter on preservation of foods by freezing. The writer admits that due to conflicting thought on this subject it is nearly impossible to present this aspect of the subject in a satisfactory manner. He devotes 23 pages to the entire subject of freezing, transportation and utilization of frozen foods, then suggests that the reader continue by reading 98 references.

This book is a good text for courses where the entire field of food technology is to be covered within a fairly short time.

J. G. Woodroof.

VEGETABLE AND FRUIT PROCESSORS SCHOOL
THE OHIO STATE UNIVERSITY
MARCH 13-17, INCL.

The third Vegetable and Fruit Processors School, scheduled for the Ohio State University, March 13-17 inclusive, is arranged so those especially interested in only one or two crops can come for the day or days when the crop or crops in which they are interested are being considered. For example, corn and peas will be featured on Monday, March 13; tomatoes and tomato products on Tuesday, March 14; snap beans, kraut, pickles, fruit and specialty products including wine on Thursday, March 16; and sanitation and nutritional aspects of processed foods on Friday, March 17.

Great interest has been manifested in a field trip to Cincinnati. Some canners have never been in a can manufacturing plant, and many have expressed an interest in seeing a modern food research laboratory. We have, therefore, arranged for a field trip on Wednesday, March 15. During this trip the group will visit the Continental Can Company at Norwood, the Kroger Food Foundation Laboratories in Cincinnati and one other laboratory (probably the Food and Drug laboratories.)

The group will travel by bus. The cost of the trip (approximately $5.00) will depend somewhat upon the number that register for the trip.

The three evening programs have been developed around research work in the Department. The first, March 13, is based on taste panel work using representative samples treated with the newer organic pesticides and samples prepared with mono-sodium glutamate. On March 14 two movies will be shown of processing and quality analysis of tomatoes and tomato products, processed under the Research and Marketing Act of the U. S. Department of Agriculture. These movies (one talkie) depict the research project of greatest interest to canners.

On March 16 fruit processing possibilities in Ohio will be discussed. Samples of fruit juice blends, concentrates and frozen fruit will be evaluated.

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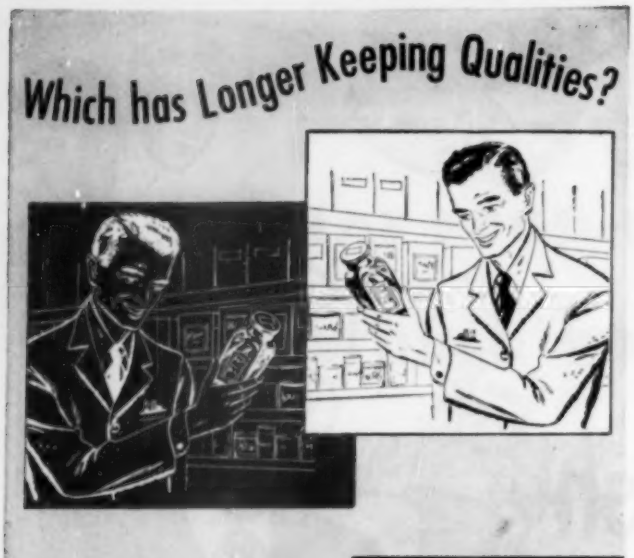

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Regional Section News

ST. LOUIS SECTION

The February meeting was held on the 14th at the St. Louis College of Pharmacy, the speaker being Mr. G. Newton Cox, Vice President in charge of Production for Coca Cola Bottling Co., St. Louis. His subject: "The Operation of a Soft Drink Plant."

GREAT LAKES SECTION

The Section's Winter Meeting was held January 20th at Detroit. More than 60 attended the afternoon session.

The afternoon session included the following papers:

"Modern Cleaning and Sanitation in the Food Industry." A. A. Roth, Wyandotte Chemical Co. Sound movies were used to illustrate good sanitation technique.

"Insecticide Applications and Problems." L. S. Roehm, Dow Chemical Co. Mr. M. R. Stephens, Federal Food and Drug Administration, joined in the discussion to clarify that Agency's position with reference to the use of certain insecticides in food plants.

"Food and Drug Regulations." M. R. Stephens, Chief, Chicago Division, Food and Drug Administration. Classification of the types of violations which make food manufacturers liable to restraining action by the Federal Food and Drug Administration was discussed.

"Food Quality Control." Max Dietz, Gerber Products Co. Quality control procedure at Gerbers was outlined.

"Atomic Energy." Edward C. Sargent, Cleveland Area Manager, U. S. Atomic Energy Commission. Movies showing the effects of atomic explosions.

After having hell scared out of them by the atomic explosion scenes, 43 steadfast members attended the dinner meeting. Col. Charles S. Lawrence, Executive Secretary of IFT, spoke on "This is your Institute—Where do we go from here." As usual, every one enjoyed the Colonel's humorous anecdotes.

WESTERN NEW YORK SECTION

A joint meeting was held with the New York State Frozen Food Locker Association at the State Agricultural and Technical Institute of Alfred, New York, on March 30th. Dr. Donald K. Tressler, Food Technology Consultant of Westport, Conn., and formerly Head, Division of Chemistry, New York State Agricultural Experiment Station, Geneva, N. Y., and Professor of Chemistry at Cornell, spoke on "Methods of Preparing Fruits, Vegetables and Cooked Foods for Freezing." A panel discussion followed Dr. Tressler's talk. Serving on this panel were Kenneth Dykstra, Director, Birds-Eye-Snider Laboratory at Albion, N. Y.; and Garth Shoemaker, Treasurer, Hygeia Refrigerating Co., Elmira, N. Y.

PUGET SOUND SECTION

The January meeting was held on the 23rd with a dinner at the Chalet in Seattle. Dr. T. L. Swenson, Director, Food, Chemical and Research Laboratories, Inc., Seattle addressed the group on "The Last Frontier of Food Quality Control: The Food Package." He outlined the historical development of food packaging from the dawn of history up to the present time.

The March 1st meeting was held at the Pommerelle Winery, through the courtesy of Mr. Fred Wann, President. Problems in wine technology were discussed, after which there was a tour of the winery.

(Continued on page 11 following technical papers)

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Editor

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Authors of papers intended for publication in Food Technology should request from the Editor's office a copy of a booklet, titled "Suggestions to Authors," and see that their papers are in the form specified therein before they are sent to the editor.

The Institute of Food Technologists assumes no responsibility for statements in contributed articles appearing in Food Technology. Editorials present only opinions of the writers and do not necessarily reflect policies of the Institute of Food Technologists.

Selected Abstracts

ANALYTICAL METHODS

81J. Rapid determination of sulfur dioxide in wine.

MATHERS, A. P. *J. Assn. Off. Agr. Chem., 32,* 745-51 (1949).

A photometric method of determining SO_2 in wine distillate using neutral lead acetate solution as an absorption medium. The colloidal lead sulphite solution obtained is evaluated photometrically. Verification may be obtained by acidification of lead sulfite solution and SO_2 content determined by iodimetric titration.

82J. Determination of fats in flour products after baking.

BURE, J., AND DELARUOZEE, G. *Ann. fals. et fraudes, 41,* 369-75 (1948).

Only after acid hydrolysis is it possible to extract the lipoids from bakery goods. Attention is called to the fact that flours contain a natural quantity of fat that must be considered in relation to the quantity declared as having been added.

83J. A study of clarification methods in the determination of sugars in white potatoes. Use of ion exchange resins.

WILLIAMS, K. T., et al. *J. Assn. Off. Agr. Chem., 32,* 698-705 (1949).

Sugar values obtained by different methods of analysis using lead acetate and carbon clarification indicated that non-sugar reducing substances were not effectively removed, thus introducing significant errors. Ion-exchange resins were found to remove effectively the interferring non-sugar reducing materials without affecting the reducing sugar content of the sample extract. Procedures for sugar in raw and dehydrated potatoes are given. Tables showing results obtained by different methods and clarification are compared. The favorable results obtained with ion-exchange resins in the clarification of sugar extracts from potatoes indicate that the use of resins might be effectively applied in sugar determinations on biological and other food materials.

84J. A study of U.S.P. XIII and N.F. VIII. Drying conditions.

DEAHL, N. L., POWERS, J. L., AND GREEN, M. W. *Bull. Nat. Form. Comm., 16,* 153-67 (1948).

Suitable drying conditions for more than one thousand compounds are described. Recommendations for changes in specifications are given in tabular form.

85J. A method of determining the mercury content of air.

VAN SUCHTELEN, H., WARMDTZ, N., AND WIGGERINK, G. L. *Philips Tech. Rev., 11,* 91-97 (1949).

Exposure for some length of time to an atmosphere contaminated with mercury vapor may be dangerous for human beings when the air contains more than 100 μg mercury per m^3, as established by American scientists. The method for determining the mercury content of air is based upon the property of the mercury atom to absorb radiation of the wavelength 2537 Å. Part of this radiation, supplied by a low-pressure mercury-vapor lamp, passes through a measuring tube through which the air to be tested is conducted and is then directed upon a photocell, while another part is thrown directly upon a second photocell. The two photo-electric currents are compared with the aid of a compensation circuit, with a tuning indicator used as zero device. The two methods by which the apparatus described is calibrated are briefly discussed. Mercury concentrations of 1 to 200% of the limit dangerous for human beings can be measured. Various possibilities of application are mentioned. This mercury-vapor detector appears to be sensitive also to all kinds of organic vapors, but to a much less degree compared to mercury, so that this does not cause serious interference. Advantage can be taken of this property of the detector for measuring the concentration of these organic vapors. Typical solvents whose vapors can be detected are xylol, monochlorobenzene, aniline, toluene, benzene, acetone, trichloroethylene and benzine. An accompanying table lists the instrument's sensitivity for each solvent.

86J. Mercury poisoning.

HARDY, H. L. *Physics Today, 2,* 7-11, Nov., 1949.

Mercury is not treated with the respect it deserves in general laboratory practice. The vapor pressure of mercury even at ordinary temperatures is sufficient to result in concentrations greater than the maximum allowable concentration. Mercury can also be absorbed through the skin. It affects the nervous system, and an early symptom is muscular tremors primarily in the eyelids, fingers, and tongue. Treatment is removal from the source of mercury until the body eliminates its mercury content. Good ventilation of laboratory areas is a wise precaution.

BIOLOGICAL SCIENCES

MICROBIOLOGY

87J. The bacteriology of spray-dried egg with particular reference to food poisoning.

(Gr. Brit.) Privy Counc. Spec. Rept. Ser., 260, 6-66 (1947).

From 1941 to 1946 approximately 9000 samples from spray-dried egg imported into Britain from America were examined bacteriol. Plate counts varied greatly, the commonest being between 5000 to 50,000 per g. Predominant bacteria were enterococci and aerobic spore-bearers, but coliform bacilli, clostridia, *Staphylococcus aureus,* and hemolytic streptococci were not uncommon. Organisms of the *Salmonella* group were found in 9.9% of the samples, and included 33 different types, the 5 most frequent being *oranienburg, montevideo, meleagridis, tennessee,* and *bareilly. Salmonella* spp. were usually present in small numbers, less than 30 per g., and the percentage 9.9 based upon one 10-g. sample is considered to be far below the true figure. Salmonella could not be demonstrated in scrambled egg and omelette prepared from freshly reconstituted egg, but if the reconstituted eggs were incubated for some hours, cooking could not be relied upon to kill all the salmonallae present. Evidence shows that dried egg was responsible for several outbreaks and large numbers of sporadic cases of *Salmonella* food poisoning. Many of the *Salmonella* types isolated in connection with these outbreaks were included in the group found from the eggs, and had not been found in Britain before the war. Clinical history of cases of *Salmonella* food poisoning associated with these new types is briefly reviewed. Bacteriol. examination of mesenteric lymph nodes of pigs resulted in finding of 17 spp. of *Salmonella,* 12 of which had not been found in Britain before the war. All but 3 were found in the eggs.

88J. Antiseptics for foodstuff. XXXV.

FUJIKAWA, F. et al. *Pharm. Soc. Japan, 69,* 106 (1949).

Growth of mold was inhibited in a 50-day test by 2,4-dihydroxybenzophenone at a concentration approximately 0.005-0.007% and by 2,4-dihydroxy-3,6-dimethylbenzophenone at a concentration of 0.010-0.015%; 2,4-dihydroxy-6-methyl-, 3,6-dihydroxy-, and 4-hydroxy-derivatives virtually showed no antiseptic action.

NUTRITION

89J. The state of vitamin A in eggs.

NEFF, A. W. et al. *Arch. Biochem., 21,* 315-20 (1949).

Methods for determination of content and of state of vitamin A in eggs that had a low carotenoid pigment content are described. Under conditions of this study, vitamin A fed at high levels was transferred more efficiently to the egg when given as vitamin A ester than when given as either vitamin A alcohol or carotene. The state of vitamin A was determined in yolk of eggs from 9 hens fed vitamin A in different forms. The vitamin A alcohol contents of the eggs analyzed varied from 71 to 93% of the total vitamin A present. At each of the three periods of the trial, eggs from hens receiving supplements of vitamin A alcohol contained approximately the same average percentage of vitamin A in the alcoholic form. Supplements of either esterified vitamin A or carotene given at high levels seemed to cause a small decrease in the percentage of alcoholic vitamin A of the eggs.

90J. The ascorbic acid value of some extra foods.

MILLER, L. A., AND BURTON, H. B. *Proc. Oklahoma Acad. Sci., 28,* 67-8 (1948).

Orange marmalades (made according to a recipe stipulating vinegar, lemon peel and juice, as well as orange, made with liquid pectin and a little soda; and made with liquid pectin and

(Continued on page 10 following technical papers)

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SUNDAY, MAY 21, 1950

Morning

Council Meeting, 10:00-1:00—Lincoln Room. Presiding—President Carl Fellers.

Afternoon

Council Luncheon, 1:00-2:00—American Room.
Council Meeting (Continued), 2:00-5:00—Lincoln Room.

Evening

Social Hours, 5:00-7:00—West Lounge.
Committee Meetings, 7:30-9:30.
Committee—The Microbiology of Citrus Products—Lincoln Room. Chairman—Reese H. Vaughn.
Other committee meetings may be scheduled later.

MONDAY, MAY 22

Morning

General Session, 9:30-12:00—Ball Room. Presiding—President Carl R. Fellers.
Introduction of Charles L. Smith, Chairman, Local Arrangements Committee.
Welcome Address—Mayor Martin H. Kennelly.
Presidential Address—Carl R. Fellers.
Address: The Relationships and Similarities of the Pharmaceutical and Food Industries—Ernest H. Volwiler.
Address: Money and Credit in The Changing World—Guy E. Reed.
Address: Modern Trends in Technological Education—Henry T. Heald.

Afternoon

Babcock Award Luncheon, 12:15-1:45—Marine Room. Presiding—Paul F. Sharp.
Address: Stephen Babcock—E. B. Hart.
Presentation of Babcock Award to Recipient—C. G. King.
Acceptance, Babcock Award—Recipient.
Concurrent Sessions, 2:00-5:00.

A. Symposium.
Chemical Agents and Residues in Foods—Michigan Room. Presiding—Bernard L. Oser.

1. From the Viewpoint of the Grower—Frank App.
2. From the Viewpoint of the Food Technologist—W. A. Britten.
3. From the Viewpoint of the Container Manufacturer—L. V. Burton.
4. From the Viewpoint of the Law—Michael F. Markel, Esq.
5. From the Viewpoint of the Consumer—A. A. Schaal.

B. Industrial and Production.
Cereal Technology—North Terrace. Presiding—John H. Nair.

6. Some Baking Industry Problems and Solutions—Arthur G. Hackett.
7. Deterioration of Stored Grain due to Moisture—Max Milner.
8. Technology in the Manufacture of Breakfast Cereals—S. F. Brockington.
9. The Role of Enzymes in Milling and Baking Technology W. F. Geddes.
10. Products Control in the Baking Industry—Ralph Mitchell.
11. Milling Technology—Del B. Pratt.

C. Research Investigations.
Section A—Lincoln Room. Presiding—George F. Stewart.

12. Effect of High Voltage Cathode Rays on Amino Acids in Fish Muscle—Bernard E. Proctor and Darshan S. Bhatia.
13. Effect of Ante-Mortem Treatment of Hogs on the Quality of the Cured Meat—N. E. Gibbons and Dyson Rose.
14. Biochemistry of Meat as Related to Tenderness—S. A. Husaini, F. E. Deatherage, and L. E. Kunkle.
15. Effect of Boning on Cooking Losses and Palatability of Beef—Pauline Paul, Mary L. Morr, Lyman Bratzler, and Margaret A. Ohlson.
16. Post-Mortem Changes in Stored Meats. II. The Effect of Atmospheres Containing Carbon Dioxide in Prolonging the Storage Life of Cut-Up Chicken—W. S. Ogilvy and John C. Ayres.
17. The Suspending Power of Carrageenin—R. C. Rose and W. H. Cook.
18. Detection of the Deterioration Products of Autoxidizing Milk Fat by Infrared Spectrometry—Albert S. Henick.
19. The Effect of Temperature on the Bacterial Infection of Shell Eggs—J. Wolk, E. H. McNally, and N. H. Spicknall.

C. Research Investigations (Continued).
Section B—American Room. Presiding—Louis B. Howard.

20. Nature of Thermal Death Time Curves for P. A. 3679 and *Clostridium botulinum*—C. R. Stumbo, J. R. Murphy, and Jeanne Cochran.
21. Heat Transfer in Commercial Glass Containers During Thermal Processing—I. S. Fagerson and W. B. Esselen, Jr.
22. Preservation of Vegetables with Subtilin and Mild Heat—Ariel A. Anderson, H. David Michener, and George S. Bohart.
23. Some Effects of Processing on the Nutritive Properties of Proteins—R. R. Baldwin, R. Thiessen, Jr., and J. R. Lowry.
24. Factors Influencing Tomato Paste Quality. I. Pectic Changes During Processing—R. J. McCulloch, B. W. Nielsen, and E. A. Beavens.
25. The Effects of Dielectric Blanching on the Quality of Canned Vegetables—J. S. Moyer, K. C. Holgate, and W. B. Robinson.
26. Drying by Infra-Red—A. Cornwell Shuman and Carroll H. Staley.
27. A Pilot Scale Study of Shell Egg Thermostabilization—Harry E. Goresline, Roy E. Moser, Jr., and Kirby M. Hayes.

Evening

Mixer, 8:00 until . . . Ball Room.
Meetings, 7:00—National Research Council, Committee on Food and Nutrition. Chairman—C. G. King.

TUESDAY, MAY 23

Morning

Section Officers Breakfast, 7:30-8:45—Berwyn Room.
Concurrent Sessions, 9:00-12:00.

A. Symposium.
Fish and Fishery By-Products—Ball Room. Presiding—H. L. A. Tarr.

28. Bacterial Spoilage of Fish and its Control—Ernest Hess.
29. Problems in Handling Fresh and Frozen Shrimp—E. A. Fieger.
30. The Effect of Storage on the Quality of Frozen Fish—W. H. Hampton.
31. Some Engineering Aspects of the Freezing, Storage and Transport of Fish—O. C. Young.
32. Fishery Products as a Source of Animal Protein—Hugo W. Nilson.
33. Commercial Processing of Frozen Fish with Ascorbic Acid—J. C. Bauernfiend and G. F. Seimers.
34. Some Chemical and Biological Tests Showing the Effect of Processing on Fish Proteins—W. H. Hastings.

B. Industrial and Production.
Canning Technology—Michigan Room. Presiding—Ray B. Wakefield.

35. Short High-temperature Sterilization and Aseptic Canning Methods—W. McK. Martin.
36. Unforeseen Corrosion in Tinplate Caps for Glass Containers—Edward F. Kohman.
37. Induced Convection Heating in the Sterilization of Canned Cream Style Corn—Paul Wilbur.
38. How We Use Our Pilot Plant—D. DeFelice and Eric Beu.
39. A New Principle for Agitating in Processing of Canned Foods—L. E. Clifcorn, G. T. Peterson, and J. M. Boyd.
40. Color Measurement of Tomato Purees—S. G. Younkin.
41. Several Practical Quality Control Measures—H. B. Rogers, Jr.

C. Research Investigations.
Section A—Lincoln Room. Presiding—John Ayres.

42. Some Factors Influencing the Functional Properties of Egg Whites—Caroline Perkins Clinger, Arlene Young, Inez Prudent, and A. R. Winter.

(Continued on page 5)

PRELIMINARY PROGRAM

(Continued from back of insert)

43. Resting-Cell Fermentation of Egg White by Streptococci—Arthur M. Kaplan, Mathilde Solowey, William W. Osborne, and Haskell S. Tubiash.
44. Storage Studies on Fermented Dried Egg White—Frances Carlin and John Ayres.
45. Egg Powder of Greatly Improved Stability—Leo Kline, Helen L. Hanson, R. F. Feeney, and Hans Lineweaver.
46. Butylated Hydroxyanixole as an Antioxidant for Fats and Foods Made with Fat—L. R. Dugan, Jr., H. R. Kraybill, Louise Ireland, and F. C. Vibrans.
47. The Use of Antioxidants in Deep Fat Frying—Louis Sair and Lloyd A. Hall.
48. Improved Food Products Using Dried Inactive Brewers Yeast—Elmer F. Glabe and Pauline F. Goldman.
49. Effect of Starch Variety and Initial Processing on Gelatinization Characteristics—H. A. Campbell and F. Hollis, Jr.

C. Research Investigations.
Section B—American Room. Presiding—Z. John Ordal.

50. The Growth Initiation of Bacteria in Defrosted Eggs—S. E. Hartsell.
51. Bacteriophage Activity in Lactic Dairy Cultures—F. E. Nelson and C. E. Parmelee.
52. Difficulties of Control in Quantitative Studies of Ultrasonic Bactericidal Effects—R. McL. Whitney and Lillian A. Russell.
53. Studies on the Possibility of the Transmission of Salmonella by Cooked Fowl—Dorothy L. Husseman and Margaret A. Wallace.
54. The Mode of Action of Sodium Benzoate—Roy E. Morse.
55. *Escherichia coli* as an Indicator of Contamination of Some Foods—Reese H. Vaughn.
56. Thermophilic Methane Fermentation of Cannery Waste—Kenneth E. Duggan and Curtis J. Wilder.
57. Vitamin B_{12}-Active Substances in Fish Products—H. L. A. Tarr and B. A. Southcott.

Afternoon

Executives Luncheon, 12:15-2:15—Marine Room. Presiding—Roy C. Newton.

Address: Your Host City: What Made it and What is it?—Leverett Lyon.

Address: The Importance of Agricultural Development to Food Processing—Allan B. Kline.

Visit Exhibitors and Personal Conferences, 2:15-5:00.

Evening

Nicholas Appert Banquet, 7:00—Ball Room. Presiding—Carl R. Fellers, President.

Presentation—Nicholas Appert Medal. Colonel Rohland A. Isker.

Acceptance Address—Thomas M. Rector. The Food Technologist—His Opportunity for Service.

WEDNESDAY, MAY 24

Morning

Food Technology Editorial Board Breakfast, 7:30-8:45—Berwyn Room. Presiding—C. Olin Ball.

Concurrent Sessions, 9:00-12:00.

A. Symposium.
By-Products of the Packing House Industry—Michigan Room. Presiding—Victor Conquest.

58. The Use of Packing House By-Products for Animal Feed (Swine and Chicks)—O. H. M. Wilder.
59. Importance of Livestock in Agricultural Economy—E. N. Wentworth.
60. The Role of the Food Technologist in the Manufacture of Canned Meats—V. R. Rupp.
61. Pharmaceuticals Derived from the Packing House Industry—S. W. Hier.
62. The Technology and Utilization of Gelatin and Bone Meal—W. F. Bronson.
63. The Packing House as a Source of Nutrition for Dogs and Cats—H. E. Robinson.

B. Industrial and Production.
Candy Technology—South Terrace Room. Presiding—Emil Mrak.

64. Confectionery Sweeteners—E. Meeker.
65. Problems in Chocolate Liquor Production—Justin J. Alikonis.
66. The Problem of Chocolate Bloom—Harvey A. Neville.
67. Trouble Shooting in the Marshmallow Field—T. J. Otterbacher.
68. Some Problems in the Manufacture of Hard Candy—A. V. Cramer.
69. Antioxidants in Fat-Containing Candies—Helen M. Robinson.

C. Research Investigations.
Section A—Lincoln Room. Presiding—Alvin I. Nelson.

70. Prevention of Sucrose Hydrate in Frozen Fruit Products—John E. Brekke and William F. Talburt.
71. Dehydrofrozen Apples—William F. Talburt, L. H. Walker, and Myron J. Powers.
72. Preparation of Frozen Apple Concentrate—L. H. Walker, C. C. Nimmo, and D. C. Patterson.
73. Preparation and Storage of Frozen Cooked Poultry and Vegetables—Helen L. Hanson, H. Margaret Winegarden, Mary B. Horton, and Hans Lineweaver.
74. The Effect of Feed on Bone Darkening of Frozen Young Chickens—Ethyl Shelor, S. R. Cecil, J. G. Woodroof, and W. E. DuPree.
75. Indirect Immersion Freezing of Fruit and Vegetable Products—George S. Smith and Manley W. Cole.
76. Survival of Microorganisms in Frozen Concentrated Orange Juice—L. S. Faville, E. C. Hill, and E. C. Parish.
77. Survival of Microorganisms in Frozen Meat—William L. Sulzbacher.

C. Research Investigations.
Section B—American Room. Presiding—M. L. Anson.

78. Some Observations on the Browning Reaction—Harry H. Beacham and Malcolm F. Dull.
79. Isolation and Characterization of Peach Tannins—Gestur Johnson, M. M. Mayer, and D. K. Johnson.
80. A Study of Blackening and Fluorescence in Potatoes—Ferne Bowman and Flora Hanning.
81. Fluorescence Changes in Solutions of Acetaldehyde and Ammonia and of Glucose and Glycine—Jesse A. Pearce.
82. Isolation and Identification of Reversion Components in Hydrogenated Soybean Oil—A. I. Schepartz and B. F. Daubert.
83. Proper Conditions for Determination of Lipase Activity—R. Hubata and G. Harvey Benham.
84. Studies on the Peroxidase in Acid Foods—E. A. Nebesky, W. B. Esselen, Jr., and C. R. Fellers.
85. Observations on the Fining of Wines with Casein—L. Meis, R. O'Neal, and W. V. Cruess.
86. A Method for Maintaining Free Sulfur Dioxide Content in Wine—H. Y. Young and E. H. Wiegand.

Afternoon

IFT Business Meeting and Luncheon, 12:15-1:45—Ball Room.

Concurrent Sessions, 2:00-5:00.

A. Discussion Group.
Frozen Foods Committee—Berwyn Room. Chairman—E. H. Wiegand.

B. Industrial and Production.
Sanitation in the Food Industry—Michigan Room. Presiding—Donald L. Truax.

87. The Sanitation Program of the National Confectioner's Association—Gerald Doolin.
88. Sanitation in a University Food Technology Curriculum—E. M. Mrak.
89. Sanitation Problems in the Frozen Food Industry—Kenneth Dykstra.
90. Design and Construction of Buildings as They Relate to Food Plant Sanitation—Austin Company.
91. Studies Relating to In-Plant Chlorination—I. I. Somers.

C. Research Investigations.
Section A—Lincoln Room. Presiding—George F. Stewart.

92. Some Growth Traits of the Food Manufacturing Industry—Allen B. Paul.
93. Some Applications of Statistics to Laboratory Taste Testing—S. Harrison and L. S. Elder.
94. Organoleptic Comparison of Large Numbers of Samples—Helen L. Hanson, Leo Kline, and Hans Lineweaver.
95. A Comparison of Sensory Methods of Measuring Differences in Food Qualities—Elsie H. Dawson and Elsie F. Dochterman.
96. Methodology for Sensory Evaluation of Imitation Peppers—David R. Peryam and VeNona W. Swartz.
97. Critique of Selected Methods for Measuring Consumers' Preferences for Canned Orange Juice—Richard L. D. Morse.

(Continued on page 15 following technical papers)

THEORY AND MECHANICS OF THE HYDROGENATION OF EDIBLE FATS

Abstract by Martin Heerdt.

Article by A. E. Bailey of The Girdler Corporation, Louisville, Kentucky, published in *Journal of the American Oil Chemists' Society* 26,10, 596 (1949).

Hydrogenation of an oil involves the following sequence of operations: (1) solution of hydrogen in the oil; (2) adsorption of dissolved hydrogen on the catalyst; (3) prior or later adsorption of unsaturated oil; (4) reaction to form a nickel-hydrogen-oil complex; (5) decomposition of the complex to yield hydrogenated oil and free nickel; (6) desorption of the hydrogenated oil.

In American practice oil for table margarine is usually prepared by hydrogenating a single liquid oil (cottonseed oil or soybean oil) or a mixture of oils to the proper consistency. Hydrogenation must be very selective with the formation of much iso-oleic acid, but very little saturated acids, to produce an acceptable low temperature body, combined with a low melting point. The best cottonseed oil products usually have an iodine value of 68-72 and an iso-oleic content of about 18-20 percent.

In the manufacture of shortenings, the object is to obtain the minimum iodine value or linoleic acid content consistent with the desired body or consistency characteristics. The body at 70-75° F. is usually more important than the high-temperature body or melting point. Very selective hydrogenation, as practiced in margarine oil manufacture, is undesirable for shortening. Whereas the lowest melting products at a given 70-75° F. consistency are obtained when hydrogenation is conducted as selectively as possible, the lowest iodine value or lowest linoleic acid content is obtained when the reaction is neither non-selective nor extremely selective, and a moderate amount of iso-oleic acids is formed.

At an acceptable shortening consistency the lowest linoleic acid content is achieved (with cottonseed oil) when hydrogenation conditions are such as to carry the iso-oleic acid content to about 15 percent at an iodine value of about 60-63. These are actually common figures for shortenings of the high stability type, whose high temperature body is not important. In other baker's shortenings the body at summer atmospheric temperatures must be considered. High temperature body is contributed by making the reaction less selective, to build up more saturated acids, and usually also by adding a small proportion of highly hardened oil. Under such conditions the optimum iso-oleic acid level (with cottonseed oil) is in the range of 8-12 percent, with the iodine value varying from about 60 to 68, according to the standards for high temperature body and the consequent amount of hard oil incorporated.

In commercial practice hydrogenation is usually carried out with fixed agitation or hydrogen dispersion, within a relatively narrow range of catalyst concentrations (usually about 0.05-0.10 percent nickel), and dependence is placed chiefly upon variations in temperature and/or pressure to achieve the desired range of selectivity for different products. The ordinary ranges of temperature and pressure are about 225-350° F. and 0-60 psig, respectively. Some plants hydrogenate all products under the same (relatively selective) conditions but this cannot be considered good practice. In all cases, however, it is desirable to use a "selective" catalyst, i.e., a catalyst which gives a minimum formation of iso-oleic acids at a given level of saturated acid formation, and vice versa.

Because of the rapidity with which the consistency of a fat changes as its iodine value is reduced, it is not easy to bring each batch of oil precisely to a desired consistency. In most plants the iodine value is simply reduced to a point where previous experience has shown the consistency to be satisfactory with the particular oil and the particular hydrogenation conditions employed. —*Commercial Fisheries Abstracts*, February, 1950.

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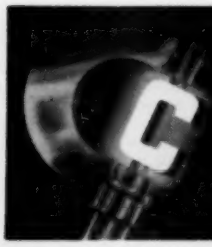

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Abstracts

(Continued from page 4 preceding technical papers)

no soda), tomato preserves, chili sauce, and catsup were tested. Some of the products stood about 8 months before testing, some were tested as soon as made and again 3 months later. The chemical titration method, using *2*, 6-dichlorophenolindophenol was followed. All of the usual precautions were observed. At least 3 tests were run on each sample. Considering the marmalades, length of storage had more effect than method of preparation. The 2 marmalades tested 8 months after preparation had somewhat similar values even though 1 had soda in it. Of all products tested, chili sauce had the highest value, fresh marmalade next, and tomato catsup lowest. Considering a rounding tablespoon as a serving, a daily serving would give from 0.8-4.2 mg., not a significant amount, but worthy of consideration.

91J. The availability of ascorbic acid of shaddock (Citrus decumana) by adult human subjects.

De, H. N., and Barai, S. C. *J. Indian Chem. Soc., 25*, 389-92 (1948).

Ascorbic acid was determined in the urine of 3 students during control and experimental periods with diets involving pure vitamin C and grapefruit juice. It was concluded that the availability of ascorbic acid of grapefruit is of the same order as that of the cryst. acid.

92J. Effect of rutin on the biological potency of vitamin C.

Crampton, E. W., and Lloyd, L. E. *Science, 110*, 18 (1949).

Although the mechanism of action of rutin is as yet undetermined, the biological value of vitamin C is enhanced by the presence of rutin.

93J. Fatty acid structure and nutritive value.

Daubert, B. F. *J. Am. Oil Chem. Soc., 26*, 466-9 (1949).

The relation of fatty acid structure to nutritive value has yet to be revealed; however, several things stand out in sharp focus. (1) Linoleic and/or arachidonic acids are essential for adequate nutrition of the rat and are apparently essential factors in maintaining the integrity of the skin of the dog and the human. (2) A definite relationship seems to exist between the metabolism of the essential fatty acids and pyridoxine in the rat. (3) Since unsaturated fatty acids can substitute for biotin in the nutrition of certain organisms, it seems that a definite relationship exists in their biosynthesis.

94J. The amino acid requirements of swine—lysine.

Mertz, E. T., Shelton, D. C., and Beeson, W. M. *J. Animal Sci., 8*, 524-31 (1949).

Lysine is essential for growth of the weanling pig. A lack of lysine inhibits growth, feed consumption and decreased feed efficiency. Lysine-deficient pigs manifest a depraved appetite, rough hair coat, emaciated look and apparent inanition.

95J. Effects of thiouracil on rate and efficiency of gains of swine.

Terrill, S. W. et al. *J. Animal Sci., 8*, 501-07 (1949).

Of the levels of thiouracil tested 0.15% is nearly optimum for fattening barrows weighing 140 to 180 pounds initially. Under conditions of equalized feed intake, thiouracil increases the rate of gain of pigs significantly and reduces the amount of feed consumed per unit of gain significantly. When comparable pigs are fed to the limit of appetite either individually or in groups, adding thiouracil to an adequate ration does not increase the rate of gain, but it does significantly reduce the amount of feed required per unit of gain as well as the feed consumption. Thus the chief benefit from thiouracil under conditions of full-feeding is to the increase in efficiency of gains rather than any increase in rapidity of gains. The optimum length of time to feed thiouracil is 4 weeks. The power of thiouracil to increase rate of gain exerts its greatest effect during either the second or third week of feeding.

96J. The effect of stilbestrol and testosterone on the growth and fattening of lambs.

Andrews, F. N., Beeson, W. M., and Harper, C. *J. Animal Sci., 8*, 578-82 (1949).

12 to 24 mg. of subcutaneous implanted stilbestrol or 10 mg. of testosterone increased the gains of wether lambs during a 68 day feeding period. All hormone treated groups required less feed per pound of gain than the control lambs. Testosterone improved carcass quality and market value.

FOOD PRODUCTS

BAKERY PRODUCTS

97J. An introduction to the micro-oven technique as applied to bakery research.

Bradhaw, R. C. A., and Coppock, J. B. M. *J. Soc. Chem. Ind., 68*, 235-7 (1949).

A new technic is described for studying the changes that take place in doughs, batters etc. using a micro-oven. The problems associated with its use are reviewed, and illustrations are given showing its application to bread doughs, sponge mixtures and emulsions.

98J. Diastatic activity of different kinds of flour.

Sapozhnikova, E. V. *Biokhimiya, 14*, 219-22 (1949).

Corn flour has a high diastatic activity. Wheat flour with a low diastatic value can be enriched by the addition of 5-10% of corn flour. Wheat flour which contains some barley often forms gluey bread, as a result of dextrins formed from α-amylase. The stickiness can be avoided by using flour 10-15 days after milling, during which time all the α-amylase will have disappeared.

COFFEE

99J. The aging of coffee.

Mendes, C. T. *Rev. Agric. (piracicaba) 23*, 81-5. (1948).

Coffee may be stored with good results for 3 or more years provided it is kept dry and away from disagreeable odors. There is color loss even when light is not involved. Experiments extended from 1936 through 1946.

FATS AND OILS

100J. Fat hydrolysis.

Mills, V., and McClain, H. K. *Ind. Eng. Chem., 41*, 1982-5 (1949).

Data are presented on the reaction of tallow and coconut oil with water, in the temperature range used in continuous fat splitting. The maximum amount of splitting which can occur is determined by the glycerol concentration in the aq. phase. This value is not affected by changes in temperature. In the range 90 to 100% completeness, the unsplit fat contains more glycerol than the original fat, an indication of the presence of a large amount of monoglyceride. The percentage of glycerol in the unsplit fat is constant, which is strong evidence that the reaction proceeds stepwise. The autoclave in which the work was done is suitable for general use.

101J. Selective enzyme hydrolysis.

Sanders, J. H. Assignor to The Proctor & Gamble Co., *2,485,779*, Oct. 25, 1949.

The process of liberating and separating substantial proportions of the lower moleculer wt. fatty acids from a mixture of glycerides having fatty radicals within the range C_{12} to C_{24} and including some which contain at least y more carbon atoms per radical than others, which comprises subjecting said mixtures of glycerides, at a temperature between about 40° F. and about 140° F. and above that at which substantial amounts of solid fats separate from the oil, to the action of an active lipase of the group consisting of oil seed lipases and steapsin, in the presence of an aq. phase until said lower moleculer weight fatty acids have been liberated to a substantial extent as a result of preferential enzyme hydrolysis, and until the free fatty acid content of the oil has increased at least about 10% and not substantially above the percentage content of lower molecular weight combined fatty acids in the original oil, then removing the partially hydrolyzed oil from the influence of active lipase and separating said free fatty acids from a residual mixture of glycerides of fatty acids having on the average longer carbon chains than those of the liberated fatty acids, and at any time following the partial hydrolysis substantially separating the aq. glycerin from the oil phase.

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Regional Section News

(Continued from page 2 preceding technical papers)

An Employment Committee, affiliated with the national office of IFT, for food technologists has been established locally. Services of this Committee are available without charge to members of the Institute, and to prospective employers seeking food technologists. Any one wishing to live, play and work in the glorious Pacific Northwest should address inquiries to Mr. Max Patashnik, Libby, McNeill and Libby, P. O. Box 1902, Seattle, Washington.

SOUTHERN CALIFORNIA SECTION

In connection with the fourth annual all-day conference of this Section, which was reported in the March issue of FOOD TECHNOLOGY, one of the outstanding events was the Food Fair consisting of new food products manufactured in southern California and marketed for the first time in 1949. Mr. Cunningham was largely responsible for the success of the interesting display. Proceedings of the all-day meeting are to be published in the near future. Price: $1.00.

The April meeting was held at the Rodger Young Auditorium in Los Angeles, the subject being "The Food Technologist and the Law." Speakers were Arthur A. Dickerman, Attorney, Federal Security Agency, General Counsel's Office, Washington, D. C., and Milton P. Duffy, Chief, California Bureau of Food and Drug Inspection, Dept. Health, Los Angeles. Discussion leader was F. L. Hart, Chief Chemist, Los Angeles District, Federal Food and Drug Administration.

PHILADELPHIA SECTION

The February meeting was held on the 23rd at Brewery Tavern. Dr. Walter L. Obold, Professor of Biological Sciences, Drexel Institute of Technology spoke on "The Presence of Chemicals in Food." This is a timely subject in view of the hearings now under way by the Federal Food and Drug Administration relative to spray residues on foods.

The matter of the desirability of holding the 1951 IFT Conference at Mackinac Island was discussed. Ever since this meeting place was announced many groups, on and off the record, have taken a dim view of the location. The sentiment of the Philadelphia Section is unfavorable because of transportation difficulties.

There was also the matter of the request of the Chicago Section that the Philadelphia Section supply talent for some of the entertainment at the "Mixer" evening at the coming National IFT Conference in Chicago. The Section, with reluctance, decided that they would not be able to gather enough talent to comply with the Chicago Section's request.

MARYLAND SECTION

The March meeting of the Section was held on the 10th at the Hotel Stafford in Baltimore. Dr. E. C. Crocker of Arthur D. Little, Inc., Cambridge, Mass. spoke on "The Chemistry of Flavors and their Evaluation." Inasmuch as Dr. Crocker directed his talk to the ultimate consumer, the housewife, efforts were made to have a good representation of wives, sweethearts, mothers-in-law and just girl friends in attendance.

(Continued on page 14)

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Abstracts

(Continued from page 10)

FRUIT AND FRUIT JUICES

102J. A third paper on syrup ratios for use as approximations in the concentrating of citrus juices.

MOORE, E. L. *Fruit Prod. J., 29,* 68-9 (1949).

A table is presented that gives the approximate number of gallons of desired ° Brix concentrated juice obtained from 100 gallons of a given ° Brix juice. An illustrative example is presented for the use of the table. As in the previously published papers, the table covers the ° Brix range of citrus juices—lime, grapefruit, tangerine, and orange juice.

103J. Clarification of fruit juices by enzymes from microorganisms.

HALBINGER, R. E. *Rev. argentina agron., 16,* 81-7 (1949).

Fresh, filtered fruit juice is still turbid from suspended pectins and proteins. Addition of 1 cc. enzyme extract from *Aspergillus wentii* or *A. fumigatus* to 9 cc. apple or grape juice cleared them within 3 hrs. at 39-40°. Extracts from *A. parasiticus, Botrytis cinerea, Fusarium fructigenum, Monilia fructigena,* and 20 other fungi were less satisfactory. The extracts were obtained by shaking 55 cc. of the culture on moist wheat bran with 45 cc. water for 20 minutes, filtering through Whatman paper no. 1 and washing with 5 cc. water.

104J. A table for use in standardizing canned citrus juices.

MOORE, E. L. *Fruit Prod. J., 29,* 38-40 (1949).

A table is presented that gives both the approximate number of gallons of 45° Brix concentrated juice and the approximate number of pounds of sucrose respectively, to add to each 100 gallons of a given ° Brix juice to obtain a desired higher ° Brix juice. Illustrative examples are given for the derivation and uses of this table.

105J. Carbohydrate fractions of lemon peel.

SINCLAIR, W. B., AND CRANDALL, P. R. *Plant Physiol., 24,* 681-705 (1949).

The soluble sugars from whole peel or albedo averaged 54.0 to 96.8% of the total alcoholic extractives, the proportion depending upon the maturity of the fruit. In addition to soluble sugars, the alcohol-soluble fraction contained substances such as essential oils, waxes, organic acids, and various concentrations of undetermined constituents. The alcohol soluble fraction also contained a substance which liberated a small amount of CO_2 on boiling with 12% HCl. As the alcohol-insoluble solids contained the pectin, most of the CO_2 occurred in this fraction. The sum of the water-soluble and ammonium citrate soluble pectin (as calcium pectate) of the whole peel amounted to 35.29% (average value) of the alcohol-insoluble solids. These values are much lower than those for total pectin calculated from CO_2 and methoxyl values, respectively.

106J. Dehydrofreezing improves food quality.

LEGAULT, R. R., AND TALBURT, W. F. *Refrig. Eng., 57,* 1175-7 (1949).

Several kinds of fruit and vegetables can be dehydrofrozen to yield products of excellent quality and convenience. A weight and volume reduction of about 50% appears attainable; with certain products greater reductions may be permissible. While the advantages of the process over conventional freezing lie largely in these reductions in weight and volume, advantages in quality and convenience appear possible especially with fruit.

107J. Dehydrating process for starchy vegetables, fruits, and the like.

GREENE, J. W., AND ROHRMAN, F. A. Assignors to Research Corp., 2,490,431, Dec. 6, 1949.

A method of dehydrating peel-covered potatoes which comprises cooking the potato, freezing and thawing the cooked potato whereby to toughen the cells thereof, forming a slurry of at least a portion of the edible part of the potato which is unpeeled in an aqueous solution containing approximately 2% by weight of NaCl to inhibit excessive rupture of the potato cells, screening the peel from the potato, mechanically separating a portion of the solution from the potato and drying the potato.

MEAT

108J. Thiamine and riboflavin retention in beef during roasting, canning and corning.

MAYFIELD, H. L., AND HEDRICK, M. T. *J. Am. Diet. Assn., 25,* 1024-7 (1949).

The effect of roasting, canning, and corning on the thiamine and riboflavin content of beef from cattle fed grass or grain for different intervals of time was determined. The apparent effect of feeding grain to range cattle appeared to be an increased fat content of the tissues which became evident sometime after sixty days. Thiamine and riboflavin values were not affected by variation in the feeds studied. During roasting, the retention of thiamine (42 to 64%) was significantly lower than that of riboflavin (83 to 102%). Thiamine retention during canning was slightly higher in metal cans (24 to 37%) than glass jars (15%), but in both cases the losses were great. Riboflavin, on the other hand, appeared to increase significantly during this process when measured by the fluorometric method (171% in glass, 213 to 280% in metal cans). Storage seemed to cause no further changes in the values of either of the vitamins. The retention of thiamine was 20 to 52% after corning, and riboflavin retention was 90 to 114%. Only 8 to 21% of the thiamine and 45 to 73% of the riboflavin were retained when the meat was cooked in addition to corning.

PECTIN AND GELS

109J. Pectins, pectic acids, and their gels.

JAKOVLIV, G. *Inds. agr. et aliment, 66,* 47-50 (1949).

Previous literature is reviewed. Hydrolysis with 0.5 or 1.5 N HCl at 0-3° and 20°, of pectin from beet cossettes yields pectic acids whose content of MeO and nongalacturonic constituents is very similar to those of pectic acids prepared under the same conditions from apple pomace.

110J. Water soluble pectic acid derivatives.

PALLMANN, H., AND DEUEL, H. Swiss 251,387, Aug. 2, 1948.

Water-insoluble, highly polymeric pectic acids are transformed into water-soluble products by heating with relatively concentrated HCHO solutions at 75-100°. The (hydroxymethyl) pectic acids thus formed are useful as thickening agents. A mixture of 10 g. pectic acid and 1 liter 15-40% HCHO is heated at 90-100° for 10-30 min. The soluble half-acetal of pectic acid is precipitated with EtOH-HCl, filtered, washed with diluted EtOH on the filter, and dried. At 80° the reaction takes place to the extent of only 40%, and at 70° not at all. Theoretical considerations are discussed.

111J. Stabilized ice-cream mixes.

STEINER, A. B. AND SPERRY, G. D. Assignors to K-Ice Co., 2,485,935, Oct. 25, 1949.

The method of stabilizing an ice cream which consists in adding to the ice cream mix, prior to freezing the same, a small but effective quantity of a propylene glycol ester of alginic acid, said acid being not less than 40% esterified and in the form of solid particles which will pass substantially completely through a 40 mesh standard screen.

SALT

112J. Mineral salt block.

DUNN, J. A., AND MILLER, F. G. Assignors to General Foods Corp., 2,489,758, Nov. 29, 1949.

A salt block of the type containing a trace mineral supplement to the animal diet in the form of an edible compound of a physiol. beneficial element dispersed throughout a dense solid mass of compressed salt, said compound being substantially soluble in digestive fluids, whereby the supplemental element is made available to the animal during digestion, but substantially insoluble in water containing 0-26% salt so that it is not dissolved by moisture absorbed by and percolating through the block.

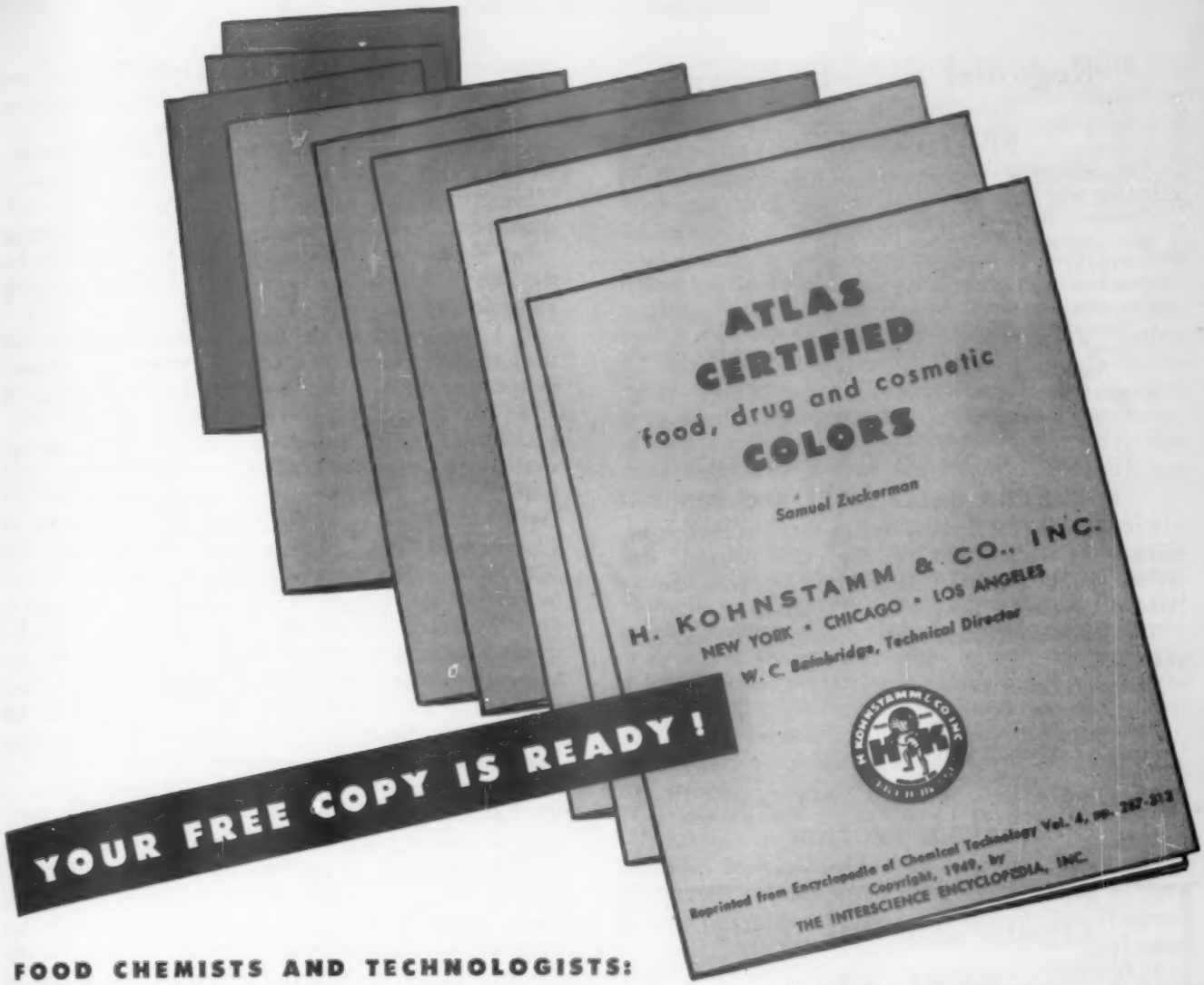
PHYSICAL SCIENCES

113J. The nature of adhesion.

MOSES, S. *Ind. Eng. Chem., 41,* 2338-42 (1949).

Analysis of the data on the adhesion of polystyrene, VYHH, and methyl methacrylate systems to aluminum alloy has shown

(Continued on 3rd cover)



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Regional Section News

(Continued from page 11)

CHICAGO SECTION

The following officers have been elected for the calendar year 1950:

Chairman: Rohland A. Isker.
Vice Chairman: B. S. Clark.
Secretary: O. G. Braun.
Treasurer: G. E. Brissey.
Executive Committee: L. R. Hedrick.
Term expires Dec. 31, 1950: W. E. Pearce.
Term expires Dec. 31, 1951: W. J. Mutschler, Dorothy Anne Huber.
Section Councilors:
Term expires Dec. 31, 1950: Rohland A. Isker, G. C. North, B. M. Shinn.
Term expires Dec. 31, 1951: L. A. Hall, B. S. Clark.

NORTHERN CALIFORNIA SECTION

President Carl R. Fellers reports that this Section has turned into the national treasury (IFT treasury, that is) the sum of $5,000 as the net proceeds from the 9th Annual Conference held at San Francisco last July.

The following officers were elected for the calendar year 1950:

Chairman: Ernest E. Jacobs.
Vice Chairman: Edwin L. Mitchell.
Secretary: Richard McKirahan.
Treasurer: Willis J. Parks.
Councilors: Robert N. Berry, Louis G. Petree.
Executive Committee: Prescott R. Lloyd, Harold S. Olcott.

OREGON SECTION

The Fifth Meeting of the Section was held February 11th on the Oregon State College campus during the Canners' and Frozen Packers' School. Talks were given by:

Thomas Bruce, Corn Products Sales, San Francisco. "Manufacture and Uses of Corn Derivatives."
V. Morgan, Lane County Health Unit, Eugene, Oregon. "The Sanitarian's Interest in the Food Industry."
R. O. Sinnhuber, Sea Foods Laboratory, Astoria, Oregon. "Research Studies in Fishery Wastes."
R. O. Behkengren, Department of Botany, Oregon State College. "Quality Control in the Pineapple Industry in Hawaii."

Following the formal program, student members held a business meeting and reported a membership of 37.

E. E. Jacobs, Chairman, Northern California Section, brought greetings from California and told of some of the activities of his Section.

It was voted to accept and sponsor the student petition for a student chapter on the campus. Such a chapter has been given tentative approval by campus authorities.

Present officers of the Section are:

Chairman: E. H. Wiegand.
Vice Chairman: J. Spencer George.
Secretary-Treasurer: G. A. Richardson.
Councilor: E. H. Wiegand.
Executive Committee: C. L. Beardsley, K. P. Fenner, E. M. Litwiller and E. I. Pitkin.

PERSONNEL

Carl R. Fellers, President, IFT, addressed the Florida Section of the Institute at Winter Haven (City of a Hundred Lakes and the Cypress Gardens—no charge for this plug) on January 26th, and the Dixie Section at Atlanta, Georgia, on February 3rd. His subject: "The Laboratory in Business." Dr. Fellers also announced that the Institute has under consideration the acquisition of *Food Research* and the incorporating of the Institute.

George Hamilton, formerly Bulk Sales Manager, Amino Products Division of International Minerals & Chemical Corp., manufacturers of Ac'cent, the stuff that "makes food flavors sing," has been named General Sales Manager. Mr. Hamilton will be responsible for the sale of Ac'cent and associated products, including glutamic acid and betaine.

E. F. Kohman, for the past 13 years associated with the Campbell Soup Co., is retiring, but will be retained as a consultant for that company and will engage in other consulting work. Dr. Kohman was born at Dillon, Dickinson County, Kansas and did his undergraduate work at the University of Kansas; he received his Ph.D. from Yale in 1915. He carried on research at the University of Illinois, and later with the old Bureau of Chemistry of the U. S. Department of Agriculture. In 1919 he joined the National Canners Association where he carried out research for 18 years. Dr. Kohman is loved by every spinach-hating moppet in the land, for it was Kohman who debunked this ex-wonder food. He showed that the oxalic acid present in spinach made unavailable for nutrition not only the calcium in the spinach, but also some of the calcium present in other foods eaten along with the spinach. The Kohman Test for butterfat was devised early in his career while at the University of Illinois. He showed, too, in the early days of vitamin C research, that it was not so much the heat that knocked out this vitamin, but rather the presence of oxygen. He demonstrated that to successfully freeze vegetables they must first be blanched; and that vine-ripened tomatoes were richer in vitamin C than those picked green and then ripened. The studies of Kohman and his coworkers on the mechanics of corrosion of tin containers were of far-reaching implication. He is the author of over 50 papers in chemical, nutritional and medical journals, and almost an equal number in trade papers. He has contributed his rich technical knowledge to several texts on nutrition and better living through adequate nutrition.

Off the sick list at two opposite ends of the United States are A. M. Neubert, in charge of the Bureau of Agricultural and Industrial Chemistry's field station at Pullman, Washington; and M. K. Veldhuis, in charge of the Bureau's field station at Winter Haven, Florida.

Milton E. Parker, director of the food engineering program at the Illinois Institute of Technology, recently addressed the 14th annual Pest Control Operators Conference at Purdue University, pointing out the need of education in and standardization of pest control and materials which may find their way into food. In portraying the need for safe and standard materials, Mr. Parker noted the responsibilities of the individual food processor under federal statute.

Arthur N. Prater, director of research, Gentry Inc., Los Angeles, has been elected a member of the board of directors.

Ralph E. Sanborn, Plant Coordination Director, California Packing Corp., has been named a member of the nine-man state water pollution control board set up by Governor Earl Warren according to a law passed by the 1949 California Legislature.

PRELIMINARY PROGRAM

(Continued from page 5 preceding technical papers)

98. Relationships between Amount and Composition of Press Fluid, Palatability, and Other Factors of Meat—A. M. Gaddis, O. G. Hankins, and R. L. Hiner.
99. Quality Evaluation of Fresh, Frozen, and Canned Sweet Corn—W. A. Gould, Fred Krantz, Jr., and James Mavis.
100. Flavor Evaluation of Canned Fruits and Vegetables Treated with Insecticides—W. A. Gould, Jay Sleesman, Roy Rings, Fred Krantz, Jr., and Margaret Lynn.

C. Research Investigations.
Section B—American Room. Presiding—Louis B. Howard.

101. Prolonging the Life of Fresh Fruits and Vegetables—Walter A. Maclinn.
102. Peracetic Acid, A New Bactericide-Fungicide: Its Application to Mold Control of Tomatoes—Frank P. Greenspan and Donald G. MacKellar.
103. Varieties and Handling of Potatoes for Chip Manufacture—R. C. Wright and T. M. Whiteman.
104. Storage Maturity of Apples in Relation to Quality of Their Frozen Product—Joseph S. Caldwell, Charles W. Culpepper, and George M. Darrow.
105. The Effect of the Length of Soak on the Quality of Canned and Frozen Montmorency Cherries—Roy E. Marshall, W. F. Robertson, C. L. Bedford, and W. H. Case.
106. The Preparation and Storage of Peach Juice—Frank A. Lee and Carl S. Pederson.
107. The Retention of Vitamin C and Color Development in Synthetic Jellies. I. Effect of Partial Sucrose Replacements—T. P. Human, Oliver J. Worthington, and E. H. Wiegand.
108. Relationship of Particle Characteristics to Rehydration Properties of Dehydrated Soups—Albert C. Rauch, James A. Luker, and J. R. Wagner.
109. A Study of the Factors Affecting Measurement of Headspace in Canned Corn—R. G. Tischer and J. G. Darroch.

Evening

Dinner and Entertainment, 7:00—Marine Dining Room.

THURSDAY, MAY 25

Morning

"Guinea Pig" Breakfast, 7:30-8:45—Marine Dining Room.

A. Symposium, 9:00-12:00.
Military Subsistence of the Future. Presiding — Colonel Rohland A. Isker.

108. Additional Burdens on Agriculture Caused by the Mobilization of Ten Million People into the Armed Forces—Frank K. Woolley.
109. Problems of Subsistence that May Confront the QMC in the Future—General W. H. Middleswart.
110. Industrial Mobilization Planning and Its Probable Effect Upon the Food Industry—Colonel H. Mackintosh.
111. Problems Encountered in the Field Relative to Special Purpose Rations During the Last War—William H. Chambers.
112. Progress on Special Rations—Colonel J. S. Kujawski.
113. Civilian Feeding in Time of an Emergency—Robert Goodhart.

Afternoon

Field Trips, from 1:00 p. m.
1. Quartermaster Food and Container Institute, U. S. Army
2. Curtiss Candy Company
3. Swift & Company
4. Corn Products Refining Company

FRIDAY, MAY 26

Morning

Field Trips, 8:00-12:00.
5. The Griffith Laboratories, Inc.
6. Kraft Foods Company
7. National Biscuit Company
8. Continental Can Company

CONFERENCE ON FOOD PROTECTION

A new organization to provide technical counsel on the utilization of new materials in the production and processing of foods was considered at a conference held in Washington, December 29, under the auspices of the Food and Nutrition Board of the National Research Council.

The conference was called by the Food and Nutrition Board for the purpose of bringing together the representative viewpoints of government, agriculture, the food and chemical industry, and public health. Among the subjects discussed in the all day session were the use of newer chemicals in the production of an adequate food supply, the introduction of functional ingredients in food processing, and the need for further knowledge in the application of these newer aids in agriculture and food technology.

By unanimous action the conference requested the chairman, Dr. H. E. Longenecker, to appoint at an early date a committee to complete organizational and operational plans for approval of various groups interested in the problem. The chairman emphasized the desirability of cooperative action by industrial, government, and other research organizations in providing the scientific guidance required for protection of the food supply with regard to both adequancy and safety.

It is anticipated that food producers and processors, the chemical industries, and the various professional organizations will be invited to participate jointly in this new activity.

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27

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FISH OILS IN GERMAN FEDERAL REPUBLIC

For more than 10 years, the consumption of fats and oils in Germany has been restricted due to the insufficiency of supply, states a September 30 report from the American Consulate at Bremerhaven. Strenuous efforts have been made to develop domestic sources of edible fats and oils, and fish oil has become a highly prized commodity. Growing supplies of imported fats and oils are decreasing the demand for fish oil and fish fat, and black-market prices are little above the official prices. However, sea fish still are of importance in Germany's fats and oils supply, accounting for about 10 percent of the domestic production or about 2 percent of the total consumption.

Fish oil is produced in two ways. Fish liver oil is produced on the catching vessel at sea by the simple steam process which extracts between 70 and 80 percent of the oil contained in the livers. Ordinarily fish oil is extracted by the fish meal factories ashore from inedible fish waste. From both types of fish oil, and edible, odorless and tasteless fat is being produced by several companies. According to the producers, the fat can be used unblended for any cooking purpose.

Only certain types of sea fish are used in Germany as a source of liver oil. The cod and haddock are the two principal sources, although ling and dogfish are also treated. When the extraction process is carefully and efficiently carried out, about 2.6 gallons of liver oil are obtained from a metric ton of cod or haddock. Yearly production of fish liver oil in Germany is estimated now to be around 317,000 gallons per year. Only a small proportion of this is used for medicinal purposes.

The ordinary fish oil is obtained as a byproduct by the fish meal factories and fish smoking plants, and is quantitatively more important as a source. This ordinary fish oil is obtained in the fish meal factories by grinding and pressing fish waste.

Commercial Fisheries Review, January, 1950.

Canned Foods as a Source of Iron

Number 7 in a series which summarizes the conclusions about canned foods reached by authorities in nutrition research

Iron performs several vital physiologic functions in the human body. (1) Certainly the best known, as well as a most important, role of iron is the formation of hemoglobin, the blood constituent which effects oxygen transport.

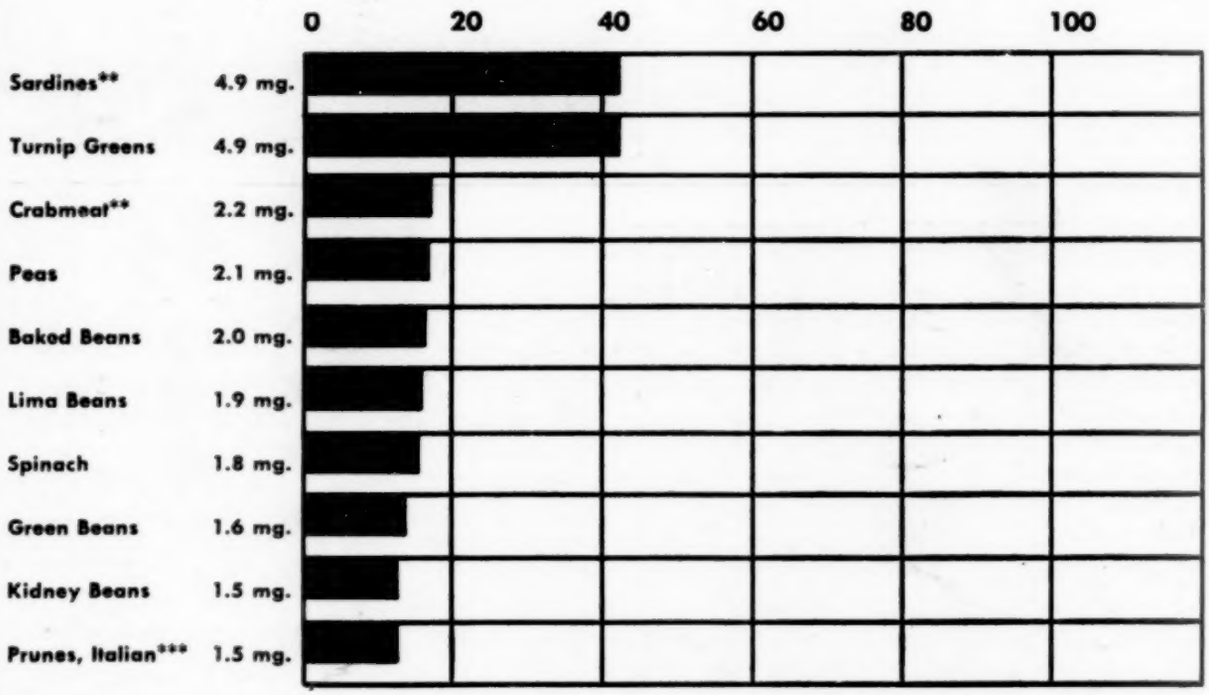
Dietary deficiency of iron may produce a definite type of anemia due to inability of the organisms to produce an adequate amount of hemoglobin. (2) This kind of anemia is not uncommon in infants, or in older individuals during periods of the life cycle in which body demands for iron are unusually heavy.

Fortunately, by intelligent diet planning, the normal individual can readily obtain an optimal supply of iron. (3) The best sources of the mineral are meats, fish, legumes, and green vegetables.

A number of canned foods, as the table below indicates, contribute more than ten per cent of the daily allowance of this essential nutrient.

Percentage of Recommended Daily Allowance* in 4-oz. (113 grams) serving (4)

(Based on analysis of the entire can contents)



*Percentage based on Recommended Daily Allowance—12 mg for physically active male—National Research Council

** Brine or oil discarded

***Pitted weight

(1) 1946. Chemistry of Food and Nutrition. H. C. Sherman. Page 283. Macmillan, New York.

(2) 1939. The New Knowledge of Nutrition. E. B. McCollum, E. Orent-Keiles, and H. G. Day. Page 211. Macmillan, New York.

(3) 1948. Recommended Daily Dietary Allowances. Page 9. National Research Council, Washington, D. C.

(4) 1947. Canned Food Reference Manual. Page 237. American Can Company, New York.

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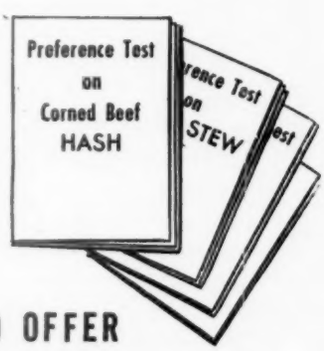
The complete results of this test, and other similar ones, are on file in our offices. They lead to a conclusion that is important to you . . . that no other single additive can, so easily and economically, *make such a difference!*



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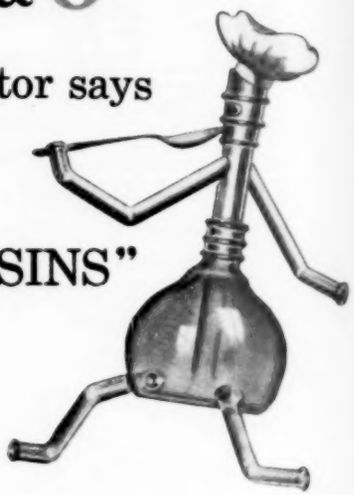

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FOOD TECHNOLOGY

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*The experiment is under the joint auspices of the Williams-Waterman Fund, Republic of the Philippines Department of Health, United States Public Health Service Rehabilitation Program, National Rice and Corn Corporation of the Philippines and Hoffmann-La Roche Inc. Preliminary reports published thus far have appeared in the Journal of Nutrition of August 1949, Journal of the Philippine Medical Association, November 1949, and the Rice Journal of April, 1950.
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Regional Section News

ST. LOUIS SECTION

The March meeting was held on the 21st at the St. Louis Dairy Co. Fred Linde, Chairman of the Section, and Chemical Engineer with Monsanto, spoke on the use of the newer agricultural chemicals.

PHILADELPHIA SECTION

The March meeting was held on the 22nd at Brewery Tavern. Lloyd E. Partain, Manager, Commercial Research Division, Curtis Publishing Co., Philadelphia, spoke on "Determining Consumer Preference." Mr. Partain discussed sampling techniques and criteria for questions to fairly determine consumer preference. Drawing from his own experience, he told of methods of determining likes and dislikes of consumers on such qualities as color of packages to the salt on a pretzel.

NORTHEAST SECTION

On February 2, the Section held a dinner meeting in Boston. This was followed by colored, silent film depicting the new bread baking installation of the First National Stores at Portland, Maine. The film was accompanied by a running commentary by James Mullen, Superintendent of the bread bakery, First National Stores, Somerville, Mass.

The main address of the February meeting dealt with the "History of the Development of Cake Production in the Baking Industry." Charles Glabau, vice president of *Bakers' Weekly* was the speaker and illustrated his take with slides.

On March 2, there was a dinner meeting at the Graduate House, M. I. T. Previous to the main address of the evening, the annual business meeting was held at which the following officers were elected for the coming year:

Chaiman: N. R. Cole, Walter Baker Division, General Foods Corp., Dorchester, Mass.

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The main address of the March meeting was given by Thomas Rector, Vice President in Charge of Research and Development, General Foods. His talk "The Food Technologists' Contribution to Advancement in the Food Industry" was enjoyed by a large group of members and students.

It is planned to hold the spring meeting at the University of Massachusetts, Amherst, on May 6th. At this meeting the main address will be given by Shelby Grey, Chief of the Boston District of the Pure Food and Drug Administration. Subject: "The Pure Food Inspector, What He Looks For, and What He Finds." It is planned to show several films of industrial opera-

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tions, including the new technicolor of "Necco Operations" (confectionery manufacture), "Time and Tide" (depicting fishing operations out of the port of Boston), and "Shrimp Operations off the Shores of Louisiana and Texas."

Requests for sponsorship by the Section have been received from members of two groups of food technology students: those at the University of Massachusetts and those at the Massachusetts Institute of Technology. This sponsorship has been approved by the Section. These two groups have also applied for recognition as student chapters of the National I. F. T.

The Samuel Cate Prescott Chapter of food technology students met on March 20th at M. I. T. to hear W. L. Campbell, Head of the Department of Food Technology at M. I. T. Professor Campbell impressed on the students the desirability of joining the Institute of Food Technologists, and gave advice on showing sincere interest in their work when they go out into the business world. The president of this chapter is Pressley W. Jones, Jr., and Secretary-Treasurer is Miss Margaret E. Irby.

SOUTHERN CALIFORNIA SECTION

The March meeting was held on the 15th at the Laboratory of Fruit and Vegetable Chemistry, Bureau of Agricultural and Industrial Chemistry, U. S. D. A., Pasadena. The building housing this laboratory is just about a year old, and dinner was served by a caterer in the spacious pilot plant of the laboratory. Prior to the meeting, a tour was made of the laboratory. After this, E. A. Beavens, Director of the Laboratory, outlined the work carried on there and called on members of the laboratory staff to discuss some of the main projects in progress.

Funds for building of this very fine structure was provided under the Research and Marketing Act of 1946. The laboratory replaces the Bureau's old research station on Mission Road, Los Angeles which has furnished in rented quarters valuable research service to fruit and vegetable industries of this region during the past 37 years. Mr. E. M. Chace, now retired, was the first director of the old Los Angeles research station.

OREGON SECTION

The first annual meeting of the Section was held in the Public Library, Portland, on March 11th. Speakers on the afternoon program were E. C. Bubl, Agricultural Chemistry, and K. Duggan, Department of Food Technology, both of Oregon State College; A. F. Bucholtz, Sick's Breweries Laboratories, Seattle; Richard Edge, Food and Drug Administration, Portland.

At the evening banquet, Dr. A. L. Strand, President, Oregon State College, spoke on "Insect Problems in the Milling Industry."

The business meeting resulted in the election of the following officers for 1950:

Chairman: J. Spencer George, Tillamook, Oregon
Vice Chairman: G. A. Richardson, Corvallis, Oregon
Secretary-Treasurer: C. E. Samuels, Dept. Food Technology, Oregon State College, Corvallis, Oregon

E. H. Wiegand, Councilor, and C. L. Beardsley, K. P. Fenner, E. M. Litwiller and E. I. Pitkin comprising the Executive Committee, continue in office.

The student group, now consisting of 45 members, reported an active program, an accepted constitution and by-laws and a full slate of officers.

The next meeting of the Section will be held early in May at Salem.

AMES SECTION

The March meeting was held on the 29th when Dr. Gail M. Dack spoke on "Food Borne Infections" and "Staphylococcus Food Poisoning." Dr. Dack is Director of the Food Research Laboratory, University of Chicago. At present he is associated with the Office of Scientific Research and Development. Dr. Dack's work on food borne infections is well-known as is also his book "Food Poisoning."

Prior to the meeting there was a dinner in the Oak Room at Memorial Union.

MARYLAND SECTION

A new approach to a pleasant meeting was tried out at the March meeting of the section (details of the March meeting were given in the April issue of FOOD TECHNOLOGY.) This new idea, suggested by Dr. Clark, consisted of the serving of preserves and exotic spices, and specially decorated ice cream provided by Crosse and Blackwell and Hendler's Creamery in Baltimore. Dr. Clark suggests that perhaps other sections would like to liven up the bill of fare by having some of the companies represented in their roster provide some of their products.

GOLDEN TRIANGLE PIONEERS

The possibility of organizing a local food group made up, of food men in the area of western Pennsylvania, eastern Ohio and West Virginia is being investigated by a committee consisting of H. N. Riley, Executive Vice President of H. J. Heinz, A. J. Claxon, President, Meadow Gold Dairy, Inc., D. M. Gray, Vice President, Stone-Mudge, Inc., H. H. Mottern, Director of Research, H. J. Heinz, H. E. Longenecker, Dean, Graduate School, University of Pittsburgh, and Fred C. Blanck, Administrative Fellow, Mellon Institute.

A meeting to ascertain the sentiment in the area specified on the advisability of perfecting a local organization was called for March 2nd at the Mellon Institute. Should such a group become born, it is planned to hold three or four meetings a year. At a later date the local organization could become a duly organized regional section of the Institute of Food Technologists.

HONORS

C. R. Fellers to Receive Babcock Award

Dr. Charles N. Frey, Acting Chairman of the Babcock Award Jury, announced today that Dr. Carl R. Fellers, President of the Institute of Food Technologists and Chairman of the Department of Food Technology of the University of Massachusetts, has been selected as the 1950 recipient of the Babcock Award. This award, consisting of a medal and a $1,000 honorarium has been provided by the Nutrition Foundation whose scientific

(Continued on page 8)

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Regional Section News

(Continued from page 6)

director, Dr. Charles G. King, will make the presentation at a noon luncheon on May 22, 1950, of the Institute of Food Technologists' Decennial Conference at the Edgewater Beach Hotel in Chicago.

Borden Award to G. Arthur Richardson

G. Arthur Richardson, Professor, Dairy Husbandry, Oregon State College, Corvallis, Oregon, received the $1,000 Borden Award in the chemistry of milk for his outstanding contributions to the knowledge of the physico-chemical properties of milk. The award was presented on the evening of April 10 at the Bellevue-Stratford Hotel during the Philadelphia session of the American Chemical Society's 117th National meeting. Professor Richardson's award address was "Some Dynamic Properties of Milk."

Professor Richardson was born at Stirling, Ontario, Canada, July 26, 1893 and received his B.Sc. (Agr.) from the University of Toronto in 1920. In 1923 he entered the University of Minnesota for graduate work under the late L. S. Palmer, receiving his M.S. in 1925 and his doctorate in 1927.

He married Mary Hall of Alberta, Canada in 1926. They have two sons: Campbell, who is at Dartmouth, and Robert, attending Corvallis High School.

Professor Richardson is also vice-chairman of the Oregon Section of IFT.

Those who wish to know what some one with a thousand bucks looks like, see the cover of the March 13th issue of *Chemical and Engineering News*.

PERSONNEL

J. J. Austin, Secretary of the Norteast Section for many years, and the newly elected vice-chairman, has recently returned from a siege at the New England Baptist Hospital. It is hoped he will have a rapid recovery.

Eleanor O. Barnes, formerly professor, Syracuse University, College of Home Economics at Syracuse, N. Y., now holds a similar position at the University of Arkansas, Fayetteville.

Clarence W. DuBois, formerly with D. K. Tressler & Associates, Westport, Conn., is now connected with Minute Maid Corp., Plymouth, Florida, one of the large producers of frozen orange concentrate.

Our IFT President, Carl R. Fellers was on active military duty two weeks in March at the Pentagon Building. And that's enough to confuse any one.

Vernon H. McFarlane, recently carrying on post graduate work at the University of Wisconsin, is now head of the Biochemical Section of the Protein and Carbohydrate Division at the Southern Regional Research Laboratory, New Orleans, La.

E. F. Kohman, with Mrs. Kohman, left in March for a six weeks trip to Mexico.

Dean Samuel C. Prescott, founder of the IFT, and Professor Emeritus of Industrial Biology at the Massachusetts Institute of Technology, was away from Boston this past winter for about a month on a trip to the West Coast. While in Los Angeles, he had the opportunity of attending the Fourth All-Day Conference of the California Section of IFT at which he made a few remarks. In Berkeley, California, he saw a number of the members of the Northern California Section and spent some time at the Refrigeration Research Foundation there. Upon his return to Boston, he reported to the Northeast Section at its March meeting on the wonderful success of the Los Angeles All-Day Conference. The Dean certainly gets around.

B. E. Proctor, Director of the Samuel Cate Prescott Laboratories of Food Technology, Massachusetts Institute of Technology, explained and demonstrated the results of experiments on processing and refrigeration of foods, on the *Boston Post* television show "At Home with Mildred Carlson," on February 28th, over WBZ-TV, Channel 14. Professor Proctor mentioned the $1,000,000 gift of the Campbell Soup Co., to M. I. T. which will be used to support M. I. T.'s research program in biology, food technology, and related scientific and engineering fields. As part of its development program, M. I. T. will erect a new building to house the Departments of Biology and Food Technology. The building will be named in memory of John Thompson Dorrance, M. I. T. '95, who was President of the Campbell Soup Co., from 1914 until his death in 1930.

L. B. Sjöstrom and E. C. Crocker attended a conference at the Bureau of Human Nutrition and Home Economics in Washington, D. C. January 23-26. Subject of the conference: "Methodology in Palatability Testing."

Necrology

Thomas M. Rector, Vice President in charge of research and development of General Foods Corporation, who was chosen to receive the Nicholas Appert Award of the Chicago Section of IFT in 1950, died suddenly on April 1st in Battle Creek, Michigan. Mr. Rector was born in Warrenton, Va. in 1894 and when but 17 years old, and fresh from high school, became assistant chemist for the Institute of Industrial Research, four years later becoming chief chemist for Pompeian Olive Oil Co. where he remained for two years. He built up his experience and knowledge by working in several other laboratories before joining General Foods in 1927 as a chemical engineer. In 1943 he became vice president in charge of research and development. Mr. Rector had the distinction of reaching the top in the chemical profession without a college degree.

The Institute and the food industry have suffered a great loss in the passing of Mr. Rector.

NOTICE—ALL MEMBERS

All members who possibly can should attend the general session Monday morning, May 22nd, at the Tenth Annual Convention because important constitutional changes will be presented for consideration.

Committee on Constitution.

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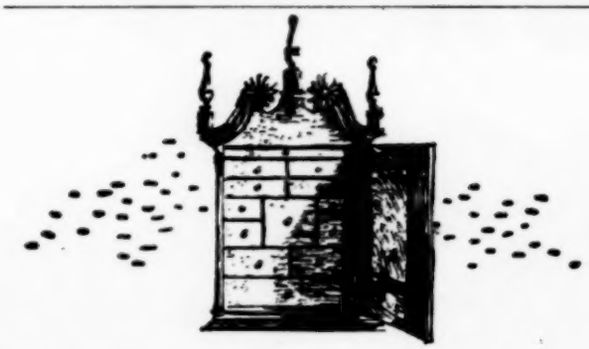

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Selected Abstracts

ANALYTICAL METHODS

116J. Displacement chromatography on synthetic ion-exchange resins. 4. The isolation of glucosamine and histidine from a protein hydrolysate.

PARTRIDGE, S. M. *Biochem. J., 45,* 459-63 (1949).

Glucosamine has been identified as a constituent of the hydrolysis product of commercial egg albumin. A primary fractionation of the hydrolysate carried out by displacing the components of the mixture from a column of "Zeo-Karb 215" by mean of diluted ammonia solution yielded a mixed band containing glucosamine and histidine together with other amino-acids in small amount. The components of the mixed band were again displaced from a smaller column of "Zeo-Karb 215" using diluted NaCl recovered in a pure condition as the hydrochloride. Histidine remained in the column. The histidine was displaced from the column by means of ammonia solution and was recovered as the free base in a substantially pure condition. The principle underlying the separation is discussed briefly and possible application to other systems are pointed out.

117J. The micro-estimation of citric acid.

WEIL-MALHERBE, H., AND BONE, A. D. *Biochem. J., 45,* 377-81 (1949).

A modification of the colorimetric estimation of citric acid is described in which permanganate is replaced by vanadic acid. This gives increased simplicity and speed of operation, and greater freedom from interference by other oxidizable substrates. The yield of pentabromoacetone is almost quant. Some recent modifications of the colorimetric estimation of pentabromoacetone are critically examined.

118J. The semi-micro estimation of lactose alone and in the presence of other sugars.

MALPRESS, F. H., AND MORRISON, A. B. *Biochem. J., 45,* 455-9 (1949).

Modifications are given for its application to solutions containing lactose in the presence of glucose and glycogen, and in tissue extracts, and more general recommendations made for its use when other contaminating sugars are present. The method is most sensitive for lactose concentration in the range 0.05-0.2%.

119J. Polarographic determination of the gamma isomer of benzenehexachloride in insecticides and soil.

GRASS, H., AND SPENCER, E. Y. *Canadian J. Res., 27F,* 368-71 (1949).

A precise and simple method for the determination of the gamma isomer of benzenehexachloride in commercial insecticides and soil by the dropping mercury electrode is outlined. A satisfactory supporting electrolyte consisted of 1% KI and a trace of gelatin in 50% EtOH.

120J. A photoelectric spectrophotometer suitable for the measurement of vitamin A by the antimony-trichloride reaction.

THOMPSON, S. Y. *Brit. J. Nutr., 3,* 43-50 (1949).

A detailed description is given of the setting up and calibration of a photoelectric spectrophotometer of the direct reading type specifically designed for the measurement of the fleeting blue color in the antimony-trichloride reaction for vitamin A.

BIOLOGICAL SCIENCES

BIOCHEMISTRY

121J. The "browning" reaction of proteins with glucose.

MOHAMMAD, A., FRAENKEL-CONRAT, H., AND OLCOTT, H. S. *Arch. Biochem., 24,* 157-78 (1949).

The reaction of proteins, protein derivatives, and model substances with glucose solutions has been studied in detail. The rate of browning is proportional to the temperature and pH. The free amino groups are the primary site of the reaction.

(Continued on page 16)

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Abstracts

(Continued from page 14)

They decrease as the reaction proceeds, and if they are masked, as by acetylation, no browning occurs at or below 53° C. Guanidyl groups are involved secondarily, but not amide groups. Tryptophan, and possibly histidine and tyrosine, is also affected. The browned derivative of bovine serum albumin has been characterized in detail by electrophoretic, ultracentrifuge, osmotic-pressure, amino acid analyses, and other technics.

122J. The basic amino acid contents of collagen and of deaminized collagen.

SALO, T. P. *Arch. Biochem., 24,* 25-30 (1949).

Arginine and histidine were redetermined in a number of different collagens. A redesigned test for arginine (chem., colormetric) is described. Deamination causes a 40% loss in total basic amino acid content with some destruction of arginine and histidine. The total basic amino acid content of mammalian collagen does not vary significantly.

123J. A new lyophilizing apparatus.

STULL, J. W., AND HERREID, E. O. *J. Dairy Sci., 32,* 973-6 (1949).

A lyophilizing apparatus is described in which the design, simplicity, and efficiency represents improvements in the types of apparatus available for small scale operation. Construction and operation are described.

MICROBIOLOGY

124J. Some studies on the survival of Escherichia coli in milk and other dairy products.

J. Milk Food Tech., 12, 317-24 (1949).

Escherichia coli will grow at 10° C. more in the warm summer months than in the winter months. A higher count and a longer survival of *E. coli* was obtained in chocolate milk and cream than in the other types of milk tested. The survival of *E. coli* depends on the storage temperature. (The higher the temperature the more the growth and the shorter the survival time.) *E. coli* still existed in large numbers for many days in milk that had passed the point of being used for food.

125J. Food preservation with antibiotics.

Info. Letter, No. 1268, 2, Jan. 7, 1950.

A new method of food preservation, using antibiotics has been announced by the USDA Bureau of Agricultural and Industrial Chemistry. Canned vegetables are sterilized by adding very small amounts of an antibiotic and then giving the sealed cans a relatively mild heat treatment. Studies so far show that canning vegetables with antibiotics, compared with ordinary canning, permits sterilizing the cans with heat more rapidly, at lower temperatures and without pressure-cooking equipment. The antibiotics used do not affect the taste of the food and the final products have better flavor than conventionally canned vegetables. In most of the tests so far the antibiotic used is subtilin, which is produced in submerged fermentation by one strain of a bacterium *(Bacillus subtilis)* which occurs widely in nature and normally exists in many food products. Peas, asparagus, and corn are the vegetables used in the studies, but preliminary work has also been done on corn, green beans, peeled potatoes, tomato juice, and milk.

NUTRITION

126J. The effect of cocoa upon calcium utilization and requirements, nitrogen retention, and fecal composition of women.

BRICKER, M. L. et al. *J. Nutr., 39,* 445-61 (1949).

The effect of the ingestion of a moderate-cost American process cocoa on calcium utilization was studied in 8 college women, 18 to 22 years of age. Five levels of cocoa (5.6, 21.0, 28.5, 34.8, 56.2 grams) were tested, 4 diets containing milk as the major source of calcium and the other in a milk free diet. No statistically significant differences were demonstrated between the calcium balances of subjects on non-cocoa diets and those of the same subjects on cocoa diets. The average daily calcium requirements for all subjects were 686 ± 52 mg. on cocoa and 669 ± 42 mg. on non-cocoa diets, or for an average 11.8 ± 0.5 mg. per kilogram of body weight. It was concluded that the tolerance of the subjects of this experiment for cocoa of the grade used was approximately one ounce daily.

127J. The nutritive value of canned foods. I. Amino acid content of fish and meat products.

DUNN, M. S. et al. *J. Nutr., 39,* 177-85 (1949).

Seventy-four individual samples were assayed for 10 essential amino acids. It was established that the sample preservation processes and the microbiological procedures employed were adequate. The distribution of the amino acids in the canned fish and meat products were generally uniform. None of the amino acids determined was significantly altered by heat processing.

128J. The nutritive value of canned foods. II. Amino acid content of fish and meat products.

NEILANDS, J. B., et al. *J. Nutr., 39,* 187-202 (1949).

The essential amino acid composition of the various species of fish investigated was found to be in fair agreement with that found by earlier workers, although some differences are noted and discussed. Excellent agreement was found with respect to the 41 samples which were assayed in both laboratories. This comparison gives evidence of the reliability of the microbiological assay technic for amino acid analysis. Heat processing as employed in canning did not change materially the essential amino acid composition of the various fish and meat samples assayed.

129J. Nitrogen balance in men consuming raw or heated egg white as a supplemental source of dietary protein.

SCUDAMORE, H. H., et al. *J. Nutr., 39,* 555-65 (1949).

Heated commercial egg white was better utilized than unheated commercial egg white, which in turn was better utilized than lactalbumin. It was concluded that egg white anti-trypsin exerts very little deleterious effect upon nitrogen balance in man under the conditions of the experiment.

130J. The effect of storage on the nutritional qualities of the proteins of wheat, corn and soybeans.

MITCHELL, H. H., AND BEADLES, J. R. *J. Nutr., 39,* 463 84 (1949).

The effect of storage at approximately 78° F. and at moisture contents of 6 to 12% for periods of from 730 to 1,020 days on the nutritive value of the proteins of wheat, corn, and soybeans was determined. Soybeans stored for 1,020 days as raw, whole beans, deteriorated definitely and significantly in both the digestibility and biological value of their protein. Neither the corn nor wheat were at all affected by the storage. The difference in response to storage between the two types of seeds may reside largely in the fact that the living part of the seed, the embryo, constitutes only a small part of the seed but a predominant part of the legume.

131J. Vitamin A utilization studies. I. The utilization of vitamin A alcohol, vitamin A acetate and vitamin A natural esters by the chick.

WEEK, E. F., AND SEVIGNE, F. J. *J. Nutr., 39,* 233-50 (1949).

Wide variations in the storage of vitamin A in the livers of chicks were found depending on the form of vitamin A fed and on the character and quantity of diluent. Importance was demonstrated of factors affecting the hydrolysis of vitamin A esters in vitamin A utilization. Carriers found to inhibit by hydrolysis were: jojoba seed oil, ethyl laurate, basking shark liver oil, mineral oil, cotton seed oil and corn oil. Sardine oil interfered with the hydrolysis of natural A esters, but not with vitamin A acetate.

132J. Vitamin A utilization studies. II. The utilization of vitamin A alcohol, vitamin A acetate and vitamin A natural esters by the rat.

WEEK, E. F., AND SEVIGNE, F. J. *J. Nutr., 39,* 251-7 (1949).

The relative biological efficiency of the three forms of vitamin A varied greatly depending on the nature and quantity of the diluent. The utilization of the three forms under identical conditions also varied greatly.

(Continued on page 20)

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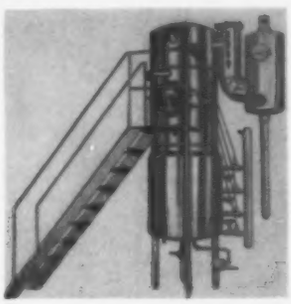

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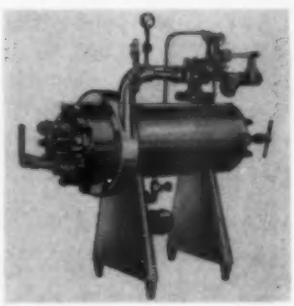

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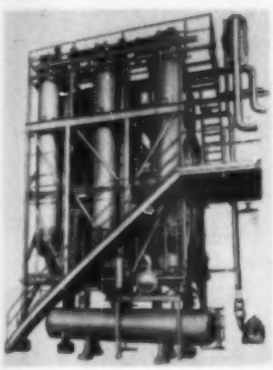

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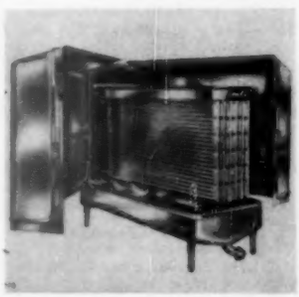

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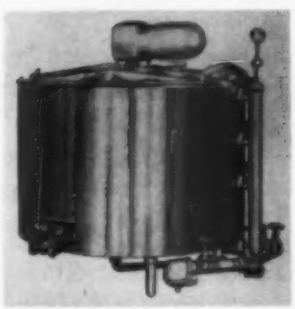

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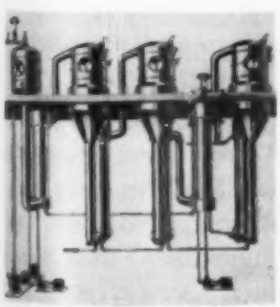

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Abstracts

(Continued from page 16)

133J. The vitamin A requirement of growing turkeys.
WHARTON, F. D. et al. *J. Nutr., 39,* 543-54 (1949).

It is concluded on the basis of the growth data, plasma levels and liver storage of vitamin A, that the vitamin A requirement of growing turkeys is 1,700 I. U. of the vitamin per 100 gm. of feed.

134J. What supplements to soybean oil meal are necessary for poultry.
CARRICK, C. W. *Soybean Dig., 10,* 24, Dec. 1949.

Inferior results in raising poultry on soybean oil meal were not due to its protein quality but to its vitamin and mineral deficiencies. These deficiencies may be easily corrected by the use of fermentation residues, or small amounts of meat or fish products. The factors usually absent from a soybean oil meal base ration are riboflavin, pantothenic acid, niacin, choline, and certain hatchability factors.

135J. The minimum riboflavin requirement of the infant.
SYNDERMAN, S. E., et al. *J. Nutr., 39,* 219-32 (1949).

An intake of 0.4 mg. of riboflavin per day by the infant served to maintain adequate blood levels, to maintain the urinary excretion at the upper limit of the zone of minimum excretion and was not associated with clinical evidences of deficiency.

136J. Growth failure in school children as associated with vitamin B_{12} deficiency—response to oral therapy.
WETZEL, N. et al. *Science, 110,* 651-3, Dec. 16, 1949.

Oral feeding of vitamin B_{12} showed marked growth response in 5 of 11 children.

137J. Succinylsulfathiazole and a rat growth factor in liver.
JONES, J. H., ROGERS, C. S., AND STONE, C. H. III. *J. Nutr., 39,* 579-90 (1949).

Young rats on a synthetic diet containing purified casein and all members of the vitamin B group except folic acid and vitamin B_{12} grew well. The addition of succinylsulfathiazole produced failure of growth, leukocytopenia, and finally death. The inclusion of folic acid in the succinylsulfathiazole diet corrected the blood picture and prevented the death of the animals, but failed to restore normal growth. The addition of crude liver extract to the animals given the succinylsulfathiazole gave them normal blood and they grew at a rapid rate. The subcutaneous injection of 0.02 ml. of a purified antipernicious anemia liver preparation in rats in the succinylsulfathiazole diet produced very good growth.

DETERGENTS

138J. Synthetic detergents.
WADDAMS, A. L. *Chem. and Ind., No. 46,* 783-8 (1949).

A review paper including: (1) Fundamental aspects of surface activity. (2) Commercial types of surface-active agents according to functionality. (3) Factors which effect detergency. (4) Mechanism of detergent action. (5) Methods of improving detergency effects on cotton and linens through the use of builders. (6) Industrial applications of synthetic detergents.

139J. Theoretical considerations of detergency.
GOETTE, E. K. *J. Colloid Sci., 4,* 459-84 (1949).

Solid particles are more difficult to remove than oily and fatty dirts. In the case of solid dirts, the smaller the particle size, the more difficult is the removal of the dirt, whereas, in the case of oily soils, the surface-active products cause droplet formation followed by soil removal. Looking at a homologous series of any soap, with increasing C-number, the optimum wetting action will be reached earlier than the optimum washing action. Branches in the paraffin chain shift both optima to a higher C-number. In this case, the absolute value for the wetting action will be increased. A second hydrophilic group in the detergent reduces both wetting action and cleaning action. The C. M. C. of anionic soaps and electroneutral soaps are reviewed because numerous soap properties show a break at or near the C. M. C. There is a break in the detergency curve which is in agreement with the C. M. C. in those cases where the full detergent power is utilized and where the dirt is not of an extremely small particle size. Furthermore, of practical interest is the break in the curves of surface activity, foam characteristics and solubility of oils and Ca-soaps at the C. M. C. In the presence of electrolytes, C. M. C. and critical washing concentration are not necessarily the same. Of basic importance in understanding the detergent action of soap and washing alkalies, are the interfacial potentials between the soiled surface, the dirt and the aqueous solution. The kind and the degree of these potentials are dependent on the ions of soap aggregates which are adsorbed preferentially by dirt and substratum. The loosening of the dirt from the substratum takes place because the detergent, due to its polar construction, goes between the dirt and the substratum. Electrostatic forces are the influencing factors which cause the loosening of the dirt; this process will be supported by mechanical movement. In general, the dirt cannot be removed if cationic soaps are used in low concentrations because the surface-active ions produce a positive charge on the dirt. But a cleaning effect with cationic soaps is possible if their concentration is high enough to give the substratum surface a positive charge. The cleaning activity of neutral or alkaline salts is dependent on the charge of their anions. Salts with multivalent cations decrease the cleaning action, because the preferentially adsorbed cations give a positive charge to the dirt as with cationic soaps. At high salt concentrations, agglomeration of the dirt takes place and the pH value also has a very important influence on the cleaning action. Therefore, cleaning action with salts present is dependent on the amount of salt and the kind and degree of charged ion preferentially adsorbed by the dirt and substratum. The increase in cleaning action with concentration of pure soap solutions below the C. M. C. can be explained by the increase in valence of the aggregation soap ions before the C. M.C. is reached and the formulation of micelles takes place.

FOOD PRODUCTS

BAKERY PRODUCTS

140J. Better cake and bread.
DAVIS, D. C. *Sci. N. L., 56,* 387 (1949).

A new process for flash-drying flour developed at the Industrial Research Institute, University of Denver, reduces moisture in flour to any level desired without damaging it. By whirling flour in a stainless steel cone in a stream of heated air, it loses from 50 to 90% of its moisture in 2 to 10 seconds. The dried flour is suitable for long storage.

141J. Cake as food.
FULLER, C. H. F. *Chem. and Ind., 45,* 771-2, Nov. 5, 1949.

Cake is defined as a baked food prepared from flour, sugar, water and one or more of the ingredients, fat, eggs, fruit and milk. Graphs are included to show the relative content of vitamins, fat, protein, carbohydrates and iron in cakes, bread, biscuits, eggs and milk. Conclusions drawn from this survey show that, while cake is not a protective food, it can play an important role in nutrition as an energy-producing food with high caloric value and provide a useful means of distributing meager amounts of eggs and fat.

FATS AND OILS

142J. Fat synthesis by micro-organisms and its possible applications in the food industry.
LUNDIN, H. *Chem. and Ind., 50,* 872 (1949).

By aerated cultivation of the type employed in the manufacture of baker's yeast or *Torulopsis utilis* (protein yeast) and employing a special fat-producing micro-organism, *Rhodotorula gracilis* (fat yeast) it is possible to product a cell substance containing 64% fat, dry basis.

143J. Antioxidant properties of polyhydroxybenzoic acids and their esters, and other nuclear substituted polyphenols.
MORRIS, S. G., AND RIEMENSCHNEIDER, R. W. *J. Am. Oil Chem. Soc., 26,* 638-44 (1949).

(Continued on 3rd cover)

Book Review

LABORATORY MANUAL AND WORK BOOK IN MICROBIOLOGY OF FOODS, by Fred W. Tanner, Ph.D., D.Sc., Professor of Bacteriology, University of Illinois. The Garrard Press, Champaign, Illinois. 386 pages. Price $4.75 without binder, $8.25 with durable binder.

Dr. Tanner's manual contains many official methods of food analysis, and assembles for the student and food technologist a tremendous amount of useful data. This is the most complete book of its kind and the first comprehensive book in the field. The methods cover much more than bacteriological examinations and include the tests used every day in industrial food laboratories.

The book is arranged so that each food is treated as a unit. References are made to Standard Methods for many foods, as well as to the literature of food microbiology and useful standard reference books. In the first five chapters, Dr. Tanner deals with food laws, postal laws, sanitation, microbiological methods, and the bacteria, yeasts and molds. Useful and complete laboratory methods are given for dairy foods — milk, butter, cheese, ice cream and miscellaneous dairy products — as well as eggs and meats. The subject of canned foods is treated very ably in 16 sections. The methods described for seafoods, frozen foods, tomato products, sugar, starches, flour, bread, spices, flavorings, condiments, nut meats and dried foods are complete and authoritative.

Most industrial laboratories have their method books covering techniques for examination of their special products. So far as this reviewer is aware, Dr. Tanner's manual and work book may well supplant many of them.

Teachers of microbiology of foods will find that the manual is well suited for their purpose because the subject matter deals with the actual examinations as carried out daily in industrial laboratories. The student pursuing this course can see that his professional training has started.

We are all fortunate that we may profit from Dr. Tanner's long experience and outstanding work in the food field. The manual will undoubtedly be widely used.

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Abstracts

(Continued from page 20)

Using the active oxygen and baked cracker tests, the classes of compounds had the following ascending order of activity, acyl phenols, polyhydroxybenzoic acid esters, phenols and several alkyl catechols.

FISH AND SEAFOOD

144J. The effect of mechanical washing of fish on the keeping quality of fillets prepared from them.

TARR, H. L. A., AND LANTZ, A. W. *Fish. Res. Bd. Canada Prog. Rep. Pac., No. 81,* 80-3, Dec., 1949.

Bacterial count was greatly reduced by washing. The keeping quality was not improved when an acid phosphate-sodium nitrite solution was used instead of water.

FLAVORS AND FLAVORING

145J. New method of curing vanilla beans.

Amer. Perf., 54, 393, Nov., 1949.

Method of curing produces known moisture content, cuts time of curing, provides ideal conditions for enzymatic development of flavor and gives a product practically free from yeast and molds.

146J. Volatile concentrates now free from tax.

Food Packer, 24, 543 (1949).

Alcohol tax laws changed to permit manufuacture of "essences." This releases the material without the $9 a spirit gallon formerly charged.

FRUIT JUICES

147J. Maine Experiment Station develops frozen apple juice.

Canner, 109, 7, Dec. 31, 1949.

Juice fresh expressed from washed and ground apples is de-aerated and concentrated under vacuum at temperatures slightly above room temperature. The resulting concentrated juice contains approximately 55% total solids and is reduced by addition of sufficient fresh apple juice to reduce the total solids to approximately 42%. The product is then chilled to a slush, filled into cans, and frozen.

MILK AND DAIRY PRODUCTS

148J. The composition and sanitary quality of a product used as whipped cream on ice cream in upstate New York.

DAHLBERG, A. C., AND KOSIKOWSKY, F. V. *J. Milk Food Tech., 12,* 325-31 (1949).

The product used as whipped cream in upstate N. Y. retail stores was collected and studied. It was generally sold as whipped cream, irrespective of its milk fat content. Most of the cream mix was whipped instantaneously by the release of the product from pressure of nitrous oxide gas. A very limited amount of cream mix was whipped by agitation using mechanical beaters or bubbling air. Of the 39 samples collected, 9 contained amounts of milk fat which were below state standards for light cream and only 2 were sufficiently rich to be heavy cream. The average percentages of fat of whipped cream prepared by 3 different devises using nitrous oxide gas were 19.7, 21.5, and 19.2. Cream mix whipped by agitation contained 29.5 percent fat. The fat was pure milk fat. Non-fat milk solids were added to a majority of the cream mixes and nearly all of them contained added sugar and vanilla. The whipped cream prepared by release from nitrous oxide pressure by 3 methods weighed an average of 0.22, 0.19, and 0.28 pound per pint. This means that 1 pint of cream mix made about 2 quarts of whipped cream. The total bacterial counts and the coliform counts on the whipped creams were high, the majority of average total counts being in the millions per gram. The flavor of some instantly whipped cream was very stale, but when made from fresh bottle cream and milk the flavor was good or excellent. The body of most of the instantly whipped cream was fluffy and of the mechanically whipped cream was good or excellent. Based upon this survey and published research, it was thought that whipped cream of satisfactory characteristics would contain not less than 27% fat and would weigh at least 0.30 pounds per pint.

TRENDS IN FISH PROCESSING

The postwar tendency to market more of the catch as fresh and frozen continued in 1949 with some signs of a recession in the expansion of frozen fish industries.

World production of salted cod and related species in 1949 is unlikely to be much greater than 1948 production. Although France, Portugal, and Spain increased their salted fish production for domestic markets, total landings of cod and related species were smaller in some countries and the quantity used for salted fish production therefore continued to decline. In 1950, however, there are prospects of a sizable expansion due partly to the expansion of the fishing fleet in Iceland and the diversion of more fishing effort from Europe to the Northwest Atlantic grounds. The production of salted winter herring in Norway was high in 1949 but is likely to be much reduced in 1950. The tuna pack in the United States of America may reach a new maximum. — *F. A. O. Fisheries Bull.,* January-February, 1950.

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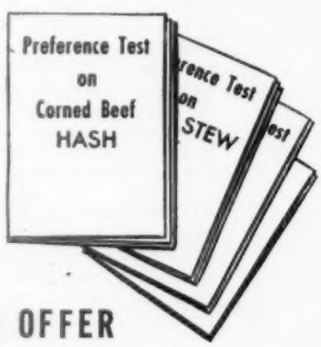

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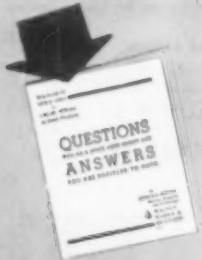

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Abstracts

(Continued from page 2)

153J. New synthetic methods for the preparation of lysine.

SAYLES, D. C., AND DEGERING, E. F. *J. Am. Chem. Soc., 71,* 3161-4 (1949).

The most promising method in this study for the commercial production of this essential amino acid appears to involve the use of ε-caprolactam. The second most practical method involves the reduction of monoethyl adipate, and conversion to 6-bromohexanioic acid. The conversion of tetramethylene chlorobromide, tetramethylene chloride, 1-nitro-4-chlorobutane to lysine may be somewhat inferior methods but are significant in case raw material values change and the by-products formed in the reactions can be utilized.

154J. The "browning reaction" in dried milk powder.

MOSTER, J. B., AND CHAPMAN, R. A. *Canadian J. Res., 27B,* 429-34 (1949).

Heated and stored dried milk powders showed a marked loss of amino nitrogen as determined by the Van Slyke volumetric method, but no loss was observed when the formol titration was used. Titration curves of the powders suggested a mechanism for the protein-sugar condensation. The heating of synthetic mixtures of amino acids and lactose resulted in intense browning, accompanied by a loss of amino nitrogen, when a large excess of lactose was employed, but no loss occurred when equal parts of sugar and amino acid were present.

BOTANY

155J. Sulfur dioxide in the atmosphere and its relation to plant life.

KATZ, M. *Ind. Eng. Chem., 41,* 2450-65 (1949).

Sulfur dioxide from industrial gases in low concentrations is widely distributed in the atmosphere. In exposures of sufficient duration to concentrations higher than about 0.40 p.p.m., it may be toxic to sensitive plants at periods during the growing season when physiological activity is high and the conditions for rapid absorption of this gas by the leaves are at a maximum. However, low concentrations in the range up to 0.10 to 0.20 p.p.m. have been demonstrated to be without influence on plant life, in the absence of visible markings. There is no effect, in this case, after long-continued exposure on rate of growth, yield of crop, photosynthesis, respiration, or on the daily march of the stomata. The effects may be beneficial if the plants are growing in a sulfur-deficient soil or nutrient. No basis has been found for the theory of invisible injury. The literature on the subject has been reviewed and the results of investigations carried out by the writer and his collaborators on various aspects of the sulfur dioxide pollution problem have bene presented: occurrence of sulfur dioxide in the atmosphere of industrial areas; sulfur content of vegetation; effect on soils; symptoms and diagnosis of injury from sulfur dioxide and other factors; experimental studies on the influence of environmental factors on susceptibility; the effects on conifers in natural habitat and transplanted stock; yield of crop plants, stomatal behavior, and photosynthesis and respiration. It is hoped that the methods and results described will serve as a guide in investigations of effects of other industrial waste gases on plant life.

MICROBIOLOGY

156J. Some nitrogenous constituents of wort and their fate during fermentation by top and bottom fermentation yeasts.

BARTON-WRIGHT, E. C. *Biochim. Biophys. Acta., 3,* 679-91 (1949).

A quantitative examination of the more important nitrogenous groupings present in wort, e.g., ammonia N amino acid N, asparagine N, residual N and protein N have been made, and their fate in fermentation by top and bottom-yeasts followed. The presence of 18 individual free amino acids has been detected in wort and the behavior of 16 during fermentation by top and bottom-yeasts followed by microbiological assay. Seven "essential" amino acids in yeast protein have been determined. The yeast was grown on media containing different sources of nitrogen. With the exception of methionine, all the acids were con-

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Authors of papers intended for publication in Food Technology should request from the Editor's office a copy of a booklet, titled "Suggestions to Authors," and see that their papers are in the form specified therein before they are sent to the editor.

The Institute of Food Technologists assumes no responsibility for statements in contributed articles appearing in Food Technology. Editorials present only opinions of the writers and do not necessarily reflect policies of the Institute of Food Technologists.

Abstracts

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stant in amount, whatever the nature of the medium. The concentration of methionine in yeast protein could be increased by increasing its concentration in the medium.

157J. Growth and fermentation factors for different brewery yeasts.

ATKIN, L., et al. *Biochim. Biophys. Acta, 3,* 692-708 (1949).

In the growth studies, it was found that lager yeast of different strains showed marked differences in their growth requirements. These growth requirements were found to be relatively stable and could be used to identify certain specific strains of yeast. In the fermentation studies, yeast nutrients were combined to produce a medium in which the fermentation rate was equal to that obtainable with beer wort. In the third phase of the work, this medium was employed under conditions of brewery fermentation such that both growth and fermentation occurred and, in this instance, it was found that inositol played a very important role in determining the rate of attenuation. The significance of this finding was further investigated with different brewery yeasts.

NUTRITION

158J. The effect of carbohydrate on the nutritive value of heated lactalbumin.

MADER, I. J., SCHROEDER, L. J., AND SMITH, A. H. *J. Nutr., 39,* 341-55 (1949).

Heating commercial lactalbumin in the dry state for 60 min. at 100° C. has no effect on its nutritional quality. Digestibility and nutritive index, however, were found to be significantly decreased by autoclaving, and the severity of the damage was directly proportional to the severity of the treatment. Heating extracted lactalbumin in the presence of lactose impairs the nutritional value.

159J. The relationship of carbohydrate metabolism to protein metabolism. III. Further observations on time of carbohydrate ingestion as a factor in protein utilization by the adult rat.

MUNRO, H. N. *J. Nutr., 39,* 375-91 (1949).

Adult male rats were first given a diet with the protein fed apart from the carbohydrate and then the same diet with most of the carbohydrate fed along with the protein. The immediate effect of this change in the time of feeding carbohydrate was a considerable improvement in N balance. After a few days, however, N balance returned to its original level. Subsequent separation of the times of ingestion of carbohydrate and protein caused a transient impairment of N balance. It has been concluded that protein utilization is affected by the presence of carbohydrate in the same meal.

160J. The nutritional effects of heat on food proteins, with particular reference to commercial processing and home cooking.

MITCHELL, H. H., HAMILTON, T. S., AND BEADLES, J. R. *J. Nutr., 39,* 413-25 (1949).

The effects of home cooking and commercial processing were investigated with the proteins of sunflower seed meal, cottonseed meal, corn and peanut meal. The biological value of the proteins of peanut, sunflower seed, and cottonseed meals were definitely decreased by processing. The percentage of total heat damage was highest for corn, followed by peanut meal, sunflower seed meal, and cottonseed. No heat damage was demonstrated in the roasting of beef.

161J. A study of the protein value of soy and peanut flours in stock diets for rats.

WALDO, M. M., AND GODDARD, V. R. *J. Home Econ., 42,* 112-15 (1950).

With 76 young male albino rats, the adequacy of soy and peanut flours as replacements for a portion of the animal protein in a stock diet was studied. The control diet (a) contained 25% protein, with casein, wheat, and skim milk as the major protein sources. The experimental diets—(b) peanut and (c) soy—had the same amount of protein and essentially identical formulas except that the casein was replaced by soy and by peanut flours. The ratio of animal to plant protein was changed from 1:0.5 to 1:2. It was found that soy and peanut flours were equally efficient in replacing the casein. The control casein diet produced significantly greater and more efficient growth than the two experimental ones. The average gain per g. protein consumed was 1.03 on the peanut diet, 1.04 on the soy, and 1.16 on the casein. From the results, it was concluded that (a) the experimental peanut and soy diets, though less efficient than the casein, produced very good growth rates and that (b) peanut and soy flours could be used effectively and economically to conserve animal protein in stock diets for rats.

162J. The use of rice as a cereal food for infants.

BENSON, R. A., SCHNEIDER, M., AND BRAND, D. *Arch. Pediat., 66,* 209, May, 1949; *Am. J. Dig. Diseases, 17,* 25-6, Jan., 1950.

A controlled feeding experiment of 47 normal infants was made. Rice was least allergenic of all cereals. The use of cream of rice produced better weight gain. Stools showed increased amount of microscopic starch granules. No gastro-intestinal disturbances were noted.

163J. Studies of the action of sodium fluoride on human enamel by electron microscopy and electron diffraction.

SCOTT, D. B., PICARD, R. G., AND WYCKOFF, R. W. G. *Pub. Health Repts., 65,* 43-56 (1950).

Electron micrographs have been made of replicas of the surfaces of enamel slabs treated with NaF solutions for lengths of time between 5 minutes and 30 days. Few visible surface changes were recognized when the treatment was less than a week. Small amounts of deposit were noted after 7 days. Greater quantities were seen after 15- and 30-day treatments. It was not visible after the prolonged washing of 30-day treated specimens. Preliminary but inconclusive tests were made of the relative acid solubilities of untreated enamel and enamel after immersion in NaF. Electron diffraction patterns have been made from the surfaces of enamel slabs before and after immersion in NaF for periods from 3 minutes to 30 days. In all instances the original apatite pattern was converted to that of CaF_2. The CaF_2 pattern reverted to that of apatite when specimens treated for 3 minutes with NaF were washed for 90 minutes in water, but when specimens treated for 30 days were washed for 6 days, the reversion did not occur in all instances. Electron micrographs of surfaces after diffraction showed amounts of deposit to be expected from the treatments they had undergone.

164J. Role of vitamin B_{12} in reproduction of poultry.

LILLIE, R. J., OLSEN, M. W., AND BIRD, H. R. *Proc. Soc. Exptl. Biol. Med., 72,* 598-602 (1949).

When hatching eggs laid by Rhode Island Red hens fed a diet deficient in vitamin B_{12} were injected with crystalline vitamin B_{12}, the hatchability was improved. Among the chicks hatched from vitamin B_{12} injected eggs, the growth rate was greater, the mortality lower and the feathering better than among chicks hatched from H_2O-injected and non-injected eggs.

FOOD PRODUCTS

BAKING AND BAKERY PRODUCTS

165J. Reaction of dough and gluten with glucose.

HLYNKA, I., AND BASS, E. J. *Cereal Chem., 26,* 513-18 (1949).

The application of the Chapman and McFarlane ferrometric reduction test to studies on dough and gluten shows that a reaction with glucose takes place. This evidence supports the hypothesis that reducing carbohydrates in dough and gluten may act as cross-linking agents between protein chains to form a three-dimensional elastomer network.

166J. Saving "dough" on bread dough.

Modern Plastics, 27, 120, Jan., 1950.

The use of tetrafluoroethylene for coating of rolls that came in contact with live dough is described. This prevents sticking of dough to rolls. Savings of $20/day/machine are reported.

(Continued on page 16 following technical papers)

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	Pectinesterase	Experimental	Demethoxylates pectin without hydrolysis of the galacturonic acid chain. pH range 3.5 - 5.
Proteolytic	RHOZYME P-11	Commercial	Hydrolyze proteins to peptides and amino acids. pH ranges 5.5 - 8.5. (Relative amounts of peptides and amino acids will differ for each proteolytic enzyme.)
	Protease 15	Experimental	
	Protease 16	Experimental	
Amylolytic	RHOZYME S	Commercial	Hydrolysis of starch to dextrins, maltose and glucose. Contain both an alpha amylase and a strong glucogenic principle. pH range 5 ▸ 6. RHOZYME S is a purified enzyme; RHOZYME T-22 the crude product.
	RHOZYME T-22	Commercial	
	RHOZYME DX	Commercial	Hydrolysis of starch to dextrins. Heat stable. pH range 5.5 - 6.5.
Lactase	Lactase A	Experimental	Hydrolysis of lactose to glucose and galactose. pH range 6.1 - 7.5.

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The primary advantage of aluminum foil for food protection is its high resistance to Moisture-Vapor Transmission—either to prevent dehydration, as in frozen foods, or to exclude moisture as from dehydrated soups. A similarly high degree of impermeability to volatile oils and odors is an important advantage to many products. Exclusion of light rays may be a benefit in some cases.

Typical packages using Reyseal

These advantages, recognized by food technologists, can *always* be achieved in maximum degree by a sufficient thickness of aluminum foil, providing the package can be adequately closed or sealed. The Reynolds Metals Company is foremost in the development of all-aluminum packages—including the versatile Reynolds Pak, a one-piece semi-rigid tray with crimp-on lid.

Practically, however, the factors of expense, availability for automatic wrapping and special sealing requirements often make desirable combinations of aluminum foil with other materials.

Hence there arose the wide field of laminated-foil packagings, in which Reynolds has pioneered. These include aluminum foil laminated to various types of paper and plastic film. "Reyseal" is the trade name given to only one broad classification—an aluminum foil and paper structure which utilizes the wax within the sheet to effect a heat seal at the point at which heat is applied.

Reynolds technical laboratories make elaborate tests to determine the values of different foil and foil-laminated packagings, as compared with other materials, for particular food products. The following is a typical test case:

PRODUCT: A dehydrated soup.

CONDITIONS: Four weeks at 100° F., 90% relative humidity.

MATERIALS: 1. Carton overwrapped with Reyseal "O" and waxed paper applied in a single wrapping operation.
2. Carton overwrap: Reyseal "502."
3. Carton made from Reyseal board.
4. Non-foil carton and liner.

RESULTS: Packages 1, 2 and 3 maintained edibility, good odor, flavor and appearance as long as three weeks, whereas product in package 4 lost flavor and acquired musty odor and taste within a week. Package 1 provided 18 times more protection from moisture gain than package 4; package 2 provided 12 times more protection; package 3, 4 times more.

A commercial use of Reynolds Pak

RECOMMENDATION: Package 1.

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(U. S. Pharmacopoeia)

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Dried Yeast

Saccharomy. Sic.—Dry Yeast

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UNIFORM TASTE-TEST METHODS SOUGHT IN FOOD RESEARCH

Agreeing that laboratory methods of taste-testing foods need to be standardized, 71 research scientists from all areas of the United States recently held a 3-day conference at the U. S. Department of Agriculture in Washington, D. C.

The conference, arranged by the Bureau of Human Nutrition and Home Economics, was attended by representatives from many fields of laboratory research, including home economists, food technologists, chemists, biologists, horticulturists and statisticians.

In calling the conference, the Bureau explained that so varied are laboratory methods of selecting food judging panels, preparing food samples, setting up rating scales, and analyzing statistical findings, that one laboratory often cannot compare its work with that of others. The problem has become more acute with an increase in research on food quality.

It was emphasized that the conference would not deal with problems of the marketing analyst who uses untrained taste-testing panels to forecast consumer acceptance of a product.

In preparation for the conference, staff members reviewed 350 bulletins and journal articles on methodology in palatability testing, and surveyed procedures for testing food quality by sensory organs. The review was mimeographed for use at the conference.

The conference closed with ten committee reports, based on the general discussion sessions. They cited techniques thought to be desirable and made recommendations as to needed lines of research.

ALUMINUM IN FOOD PROCESSING EQUIPMENT

Book, Aluminum and Aluminum Alloys in the Food Industry, by J. M. Bryan, published by Department of Scientific and Industrial Research (H. M. Stationery Office, York House, Kingsway, London, W. C. 2, England), 153 pp. In English. Reviewed by Ernest Hess.

A systematic study with an extensive bibliography, this publication discusses various types of corrosion of aluminum and aluminum alloys by aqueous solutions (acids, alkalis and bases, water, dissolved salts) and by food products (fruit and vegetable products, beverages, meat and dairy products).

(Continued on 3rd cover)

Notes and Letters

Vegetable Juice Agar as a Culture Medium*

Yeast sporulation has been induced by growth on gypsum blocks and sterile vegetable slices. An adaptation of the latter technique involves the solidification of certain vegetable juices with the aid of agar. A further refinement of this procedure described by Wickerham, Flickinger and Burton (*J. Bact., 52,* 611, 1946) entails the solidification of canned mixed vegetable juices to which yeast cake has been added.

During a recent study the above medium was used to bring about yeast sporulation. Stock cultures of various yeast strains were carried on wort agars and transplants were made simultaneously with vegetable juice agar (VJA) inoculation. It was observed that growth appeared much sooner on the VJA slants than on the wort transplants. These observations were confirmed by expanding the use of VJA to many yeast strains including *Saccharomyces ellipsoideus (Tokay), (Champagne), (Bergundy), (Jerez), Saccharomyces cerevisiae (Bakers')*, a culture of *Saccharomyces spp.* isolated from spoiled salad dressing and *Zygosaccharomyces spp.* from the same source. In all instances growth appeared sooner and was more profuse on VJA than on wort agar.

A further study was made wherein the two media were compared as contact plating media for mold counting. In the several studies made 20% more VJA agar plates showed growth than did wort agar plates. Further, growth appeared sooner on VJA than on wort agar.

The organism responsible for flat sour spoilage of tomato juice, *Bacillus thermoacidurans*, has been described by Stern, Hegarty and Williams (*Food Res., 7,* 186, 1942) as extremely difficult to subculture. When cultured on VJA agar this organism grew more rapidly and profusely than it did on proteose peptone acid agar. Excellent growth was also shown by *Lactobacillus lycopersici*, another acid food spoilage organism. No observations were made on morphological changes.

ROY E. MORSE
Monsanto Chemical Company,
Anniston, Alabama.

EVAN K. HEATON
University of Georgia, Athens,
Georgia.

* In these studies V8, a mixture of tomato, celery, carrot, parsley, lettuce, beet, spinach and watercress juices was used as recommended by Wickerham, Flickinger and Burton. There are other commercial juices available which presumably give similar results, but they were not tried.

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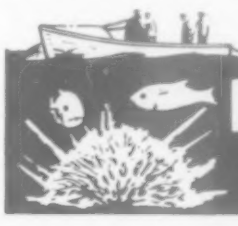

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CANDY MADE FROM SWEET POTATOES

"Candies from Sweet Potatoes," a topic highly publicized during World War II due to results of experimental research at the A. P. I. Agricultural Experiment Station at Auburn, Alabama, is today coming back into the headlines as a result of current research at the same Station.

A recently completed nationwide consumer acceptance test of one of these new candies—a cocoanut brittle made from sweet potatoes—indicates that more than 40 percent of the Nation's consumers like this new candy product as well as or better than the candies they are currently buying and eating. This new type candy stands up better in comparison with brittles and hard candies than with other candies.

More than a third of the individuals who tested this candy indicated that they would buy the product if it were available on the market. In addition, more than half like the texture or quality of the product and about one-half like its flavor or taste. A. P. I. Agricultural Experiment Station Bulletin No. 271, "Consumer Reactions to Alayam Candy" reports the detailed findings of this survey.

Copies of the report "Consumer Reactions to Alayam Candy," A. P. I. Experiment Station Bulletin No. 271, are available upon request from the Publications Department, A. P. I. Agricultural Experiment Station, Auburn, Alabama.

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Regional Section News

FLORIDA SECTION

The April meeting was held on the 20th at the Angebilt Hotel, Orlando, Fla. Dr. F. W. Tanner, for many years head of the Department of Bacteriology, University of Illinois, and author of several textbooks on bacteriology, spoke on "What is Sanitation"?

Dr. Tanner has now retired and is living at Winter Park, Fla.

NEW YORK SECTION

A dinner meeting was held at the Brass Rail, New York City on April 11th, attended by 141. S. W. Arenson, Chief of Fundamental Research Laboratories, Doughnut Corporation of America, gave an interesting illustrative talk relative to shortening requirements in various food field applications, and problems encountered in their use.

MARYLAND SECTION

The April meeting was held at the Hotel Stafford in Baltimore on the 14th. Dr. E. Everett Mescher of the American Preserve Co., and also Chairman of the Technical Committee of the National Preservers' Association, spoke on "Jams and Jellies."

PHILADELPHIA SECTION

Dr. Joseph W. E. Harrison, Director of LaWall and Harrison of Philadelphia, addressed the Section at its April meeting on the 19th. Dr. Harrison, who is a consultant to the Pennsylvania Department of Agriculture, Chairman of the Board of Chemists and Professor of Pharmacy, and Director of the Liffman-LaWall Laboratory of the Philadelphia College of Pharmacy, chose as his subject:: "Adulteration of Foods." His address was illustrated with color slides.

GREAT LAKES SECTION

The Section held an all-day meeting on April 14th. In the morning, members and guests toured the campus and laboratories of Michigan State College. After a lunch at Union Cafeteria the afternoon session consisted of the following:

Angles on quality control for the not-so-large food producers. Prof. Thomas Ousdorff, Oregon State College.

Dietary habits of the Liberian natives. George A. Bowie, Dept. Public Relations, Firestone Tire and Rubber Co.

Certified Food Colors. W. H. Kretlow, Director of Production and Research, Color Division, Wm. J. Stange Co.

The evening program consisted of music by members of the Michigan State College Music Department; an address by Dr. John A. Hannah, President of the College; and a motion picture of the 1949 Michigan State College-Notre Dame football game.

NORTHERN CALIFORNIA SECTION

The Section met on April 27th at the California and Hawaiian Sugar Refining Corporation, Crockett. The meeting consisted of plant inspection followed by a dinner in the Community Auditorium and a technical discussion. C. and H. refinery is the largest single refinery in the world, having a daily capacity of over 3,000 tons of sugar and annually refines over 10% of the entire nation's requirements.

PERSONNEL

J. L. Heid, formerly Director of Research of the Florida Citrus Canners Cooperative at Lake Wales, Florida has resigned to become general manager of the Golden Citrus Juice Co., Fullerton, California. Larry has a fine parcel of land (that costs a ridiculous sum to keep landscaped) on a lake near Lake Wales. Any one interested?

Paul Kolachov, Director of Research at Joseph E. Seagram & Sons, Inc., Louisville, Kentucky, has been elected to the Board of Governors of the National Farm Chemurgic Council.

Eugene J. Kraska, formerly conducting his own canned food laboratory at Manitowoc, Wisconsin, has joined the Association of American Railroads, Freight Claims Division, Chicago, as canned food specialist. His new duties will be to investigate the causes of damage to canned goods and suggest preventive measures. He will also cooperate with can manufacturers and trade associations in matters of common interest. It is anticipated that this work will be instrumental in assisting the railroads and their patrons in reducing damage to canned goods, which in 1948 amounted to over 7.5 million dollars, an increase of 20.4% over 1947, with a still further increase indicated for 1949.

Carl S. Miner, Director, Miner Laboratories, Chicago, has been elected to the board of directors of Commercial Solvents.

H. W. Putnam, formerly chemist with the Central Laboratories, Colorado Milling Co., is now Director of Research, Ballard and Ballard Co., Louisville, Kentucky.

Harry Pancoast is now with American Home Food Products, San Jose, California.

Gustave T. Reich has recently returned from a five weeks' trip to Guatemala, where he did some consulting work on alcohol and sugar production. Dr. Reich reports that Guatemalan rum is quite palatable even though it does contain a high percentage of aldehyde and fusel oil.

Leonard J. Vinson, formerly biochemist, Armour Research Foundation, Chicago, has been appointed director of biochemical research at Lever Brothers, Cambridge, Mass.

Ralph C. Zalkan, formerly of the Food Technology Department of the University of Massachusetts, is now a graduate student at Michigan State College.

Two members of IFT have made the cover of *Chemical & Engineering News* within a space of six weeks: George A. Richardson of the Oregon Section (March 13th issue), and Arie Jan Haagen-Smit (April 24th issue) of the Southern California Section.

NECROLOGY

E. H. Bell, Pacific Coast President of American Can Co., died in San Francisco on January 12, 1950. He was 61 years old.

HONORS

Carl R. Fellers, President of the Institute of Food Technologists, and Chairman of the Department of Food Technology of the University of Massachusetts, received the 1950 Babcock Award at the Annual Con-

ference of the Institute held in Chicago in May. Dr. Charles G. King made the presentation.

William F. Geddes, Chief of Biochemistry Division, University of Minnesota, was named recipient of the Thomas Burr Osborne Medal of the American Association of Cereal Chemists, for his "distinguished contributions in cereal chemistry." The medal has been conferred only seven times previously in the entire history of the Association. The medal was founded in 1926, and Osborne, who was for a long time connected with the Connecticut Agricultural Experiment Station, received the medal in 1928 and was the first recipient.

AUSSIES CUT UP

The Food Technology Association of Victoria had a cutting bee and buffet supper at the William Angliss Food Trades School in Melbourne on March 9th. The items cut included an ice cream mix, apricot jam and steak and kidney pudding supplied by different competitors.

Book Review

ADVANCES IN FOOD RESEARCH, VOLUME 2. Edited by E. M. Mrak, University of California, Berkeley, California, and G. F. Stewart, Iowa State College, Ames, Iowa. Academic Press Inc., 125 East Twenty-third Street, New York 10, N. Y., 1949. 558 pages. Price $8.80.

The present volume is the second of a series about Advances in Food Research. It presents nine reviews by thirteen authors of the following subjects: 1) Ion exchange application by the food industry, by George E. Felton; 2) Thermobacteriology as applied to food processing, by C. R. Stumbo; 3) The quaternary ammonium compounds and their uses in the food industry, by Cecil Gordon Dunn; 4) The pharmacology of DDT, by Arnold J. Lehman; 5) Analysis of foods by sensory difference tests, by Mildred M. Boggs and Helen L. Hanson; 6) The chemistry of fruit and vegetable flavors, by Justus G. Kirchner; 7) Histological changes induced in fruits and vegetables by processing, by T. Elliot Weier and C. Ralph Stocking; 8) The spoilage of fish and its preservation by chilling, by G. A. Reay and J. M. Shewan; 9) Spray drying of foods, by Edward Seltzer and James T. Settelmeyer.

The author of the section on ion exchange resins discusses cation and anion exchangers, the factors controlling the phenomenon, and specific industrial applications. It is an excellent resume of an increasingly important aspect of food technology. General interest in this subject is shown by reference to 144 literature citations.

The review of thermobacteriology is a model of conciseness and clarity. The author has digested and set down in one place information that is widely scattered in the literature. The reader will find it a veritable mine of information.

Interest in quaternary ammonium compounds has accelerated at a rapid rate in recent years. An astonishing volume of literature—more than 300 references—is reviewed concisely by the author of this section.

The pharmacology of DDT is treated in a short review that brings the reader up to date on an important aspect of food technology in which there is considerable present interest.

The section on the analysis of foods by sensory difference tests deals with methods for the appraisal of foods through the use of the senses as distinguished from physical and chemical methods. It is not concerned with consumer preference studies with which it is too often confused. The authors bring together in clear and lucid fashion the best thought on the subject, and many readers should find the discussion interesting and useful.

The chemistry of fruit and vegetable flavors is exceedingly complex and the difficulty of working with them is greatly accentuated by their instability. The author of this section reviews existing information about this much negelected field of research and stresses the fact that even in the limited field explored, the identification of flavor components is meager and incomplete. It is interesting to note that among the 171 references cited roughly two thirds are from foreign journals, a circumstance that might be construed to indicate greater interest in the subject abroad than at home.

Histological changes induced in fruits and vegetables by processing are described in another section in a thought-provocative manner. The authors point out what happens to various tissues during processing and the influence of these changes on quality. Illustrations of tissue sections are interesting and clear.

The bacteriology and biochemistry involved in the deterioration of fresh fish is treated in a section on the spoilage of fish and its preservation by chilling. The authors describe the influence of present methods of handling on ultimate quality. There is much of practical value in this competent review.

Those interested in spray drying of foods will find in this section a description of the various spray drying procedures and equipment well illustrated with diagrams and photographs. General principles and engineering data are stressed rather than applications to specific foods. This type of treatment makes this section of particular value to those confronted with spray drying problems. The authors are to be commended for bringing together and adding to the information on this important subject in such excellent fashion.

It is characteristic of this volume that the various authors take pains to point out the areas in which research data is conspicuously lacking. Because of the authors' expertness in their individual fields, these comments perform a valuable and interesting service.

The format and printing of the book is excellent. The reviewer found few typographical errors, none of them of a misleading nature. This volume is a must for all serious food research workers and food technologists.

CHARLES G. FERRARI.

Abstracts

(Continued from page 6 preceding technical papers)

167J. Properties of angel food affected by basic ingredients. Part I.

GLABAU, C. A. *Bakers Weekly, 145,* 46-9, Jan. 2, 1950.

When the sugar is varied, (1) the quantity of all of the other ingredients varies, changing the composition in the formula. (2) The cakes rise more evenly with an increase in the quantity of sugar, more uniformly filling the pans and giving an increase in volume. (3) Sugar has a marked effect upon the upper surface of the cake. The surface also becomes much drier. (4) The cake becomes more tender and softer. (5) Practically all of the characteristics are favorable, giving a higher score value as the quantity of sugar increases. Cakes are scored on eleven attributes in addition to pH, volume, shearing and compressibility tests.

COFFEE

168J. The volatile constituents of roasted coffee.

HUGHES, E. B., AND SMITH, R. F. *J. Soc. Chem. Ind., 68, 322-7* (1949).

In an investigation into the production of aroma in roasted coffee, some of the principal volatile constituents have been determined. In the staling of coffee, only small losses of aldehydes, acetone, and volatile phenols occurred, and there was no loss of pyridine or of furfural, despite the volatility of these constituents. Apart from a conversion of diacetyl to acetyl-methyl carbinol, no change indicating a loss of aroma was discovered. When coffee was prepared for drinking, some losses of volatile constituents were detected. The substance, or substances, giving the characteristic aroma to roasted coffee is as yet unidentified. It is probable that other less volatile substances, that are soluble in light petroleum and are readily oxidizable, are involved in the flavor of roasted coffee.

FATS AND OILS

169J. Synergistic antioxidants and the methods of preparing the same.

HALL, L. A. Assignor to the Griffith Laboratories, Inc. 2,493,288, Jan. 3, 1950.

The method of incorporating a low alkyl ester of gallic acid in a fatty material in an amount greater than that which is normally soluble in said fatty material, which comprises dissolving ester in a molten phospholipoid, then introducing the molten solution to the fatty composition, likewise in molten form, and thoroughly admixing the materials.

170J. The use of antioxidants in potato chipping.

MAGOFFIN, J. E., AND BENTZ, R. W. *J. Am. Oil Chem. Soc., 26,* 687-91 (1949).

Laboratory and commercial fryings of potato chips made with vegetable oils, vegetable shortenings, and lard were protected by butylated hydroxyanisole through the process. Propyl gallate and citric acid were effective synergists to B. H. A.

FISH AND SEAFOOD

171J. The use of pH measurements for estimating the freshness of cod fillets.

KONDRUP, M. *Fiskeriminist Forsogslab. Medd., No. 73* (1948); *Food Sci. Abst., 21,* 294, No. 1225 (1949).

In Denmark, organoleptic examination by skilled personnel is used to estimate the keeping qualities of cod fillets for export. Samples are kept at 0° C. and the keeping time at this temperature is used as an index. An attempt was made to replace this subjective method by pH measurements. Such measurements were therefore carried out parallel with the organoleptic tests, for a period of over 6 months and on 215 samples, and results were treated statistically. It was found that a pH value of 7.3 normally coincided with the time at which organoleptic tests showed incipient spoilage. However, the standard deviation from this mean was so great (S = 0.25 pH units) that there was only a probability of 16% that incipient spoilage would lie between pH 7.25 and pH 7.35. pH measurements as a means of detecting incipient spoilage in cod fillets must therefore be rejected.

FRUIT AND FRUIT JUICES

172J. Florida coldpressed grapefruit oil.

KESTERSON, J. W. *Am. Perf., 29,* 29-32, Jan., 1950.

Some physical and chemical properties of several grapefruit oils are given. Grapefruit oil from Florida, in general, has been contaminated with orange oil for several years.

JAMS AND JELLIES

173J. Testing consistency with spreadmeter.

Food Pack, 30 (1949).

National Preservers Association suggests a concentric series of circles engraved on plexis to measure spread of preserve as an indication of gel quality.

NUTS

174J. Process of roasting whole nuts.

FISHER, G. A. Assignor to W. S. Scull Co. 2,496,462, Feb. 7, 1950.

The method of preparing salted whole nuts which comprises roasting the nuts, thereafter applying to the roasted nuts whole butter which has been heated at a low temperature until substantially all of the moisture is driven off and thereafter heated to a temperature between 250° F. and 400° F. for a period of ten to twenty minutes on applying salt to the nuts.

175J. Peanut products and process for preparing the same.

OWEN, J. T. Assignor to Merck & Co., Inc., 2,494,717, Jan. 17, 1950.

A peanut preparation stabilized against rancidity comprising peanuts and an external coating of salt containing an inhibitor selected from the group which consists of ascorbic acid, salts of ascorbic acid and esters thereof.

176J. Manufacture of nut butter.

FISHER, G. A. Assignor to W. S. Scull Co., 2,496,461, Feb. 7, 1950.

The process of preparing a substantially stabilized nut butter which comprises roasting the whole nuts, applying to the unground nuts whole butter which has been heated to a temperature between 250° F. and 400° F. for a period of not less than 10 to 20 minutes, and thereafter comminuting the nuts.

177J. Ascorbic acid from walnut hulls.

KLOSE, A. A., et al. *Ind. Eng. Chem., 42,* 387-91, Feb., 1950.

In studies on recovery of ascorbic acid from waste green walnut hulls, an over-all yield of crystalline product of 25 to 50% was obtained. Experimental details are presented for the following steps: extraction in diluted aqueous sulfur dioxide solution; purification of the extract by absorption on, and elution from, anion exchange resin; and crystallization from the concentrated decolorized eluates. Pilot plant scale extraction operations were conducted. Economic analysis of the extraction process indicates that the process is marginal unless other use can be made of the equipment during the off-season.

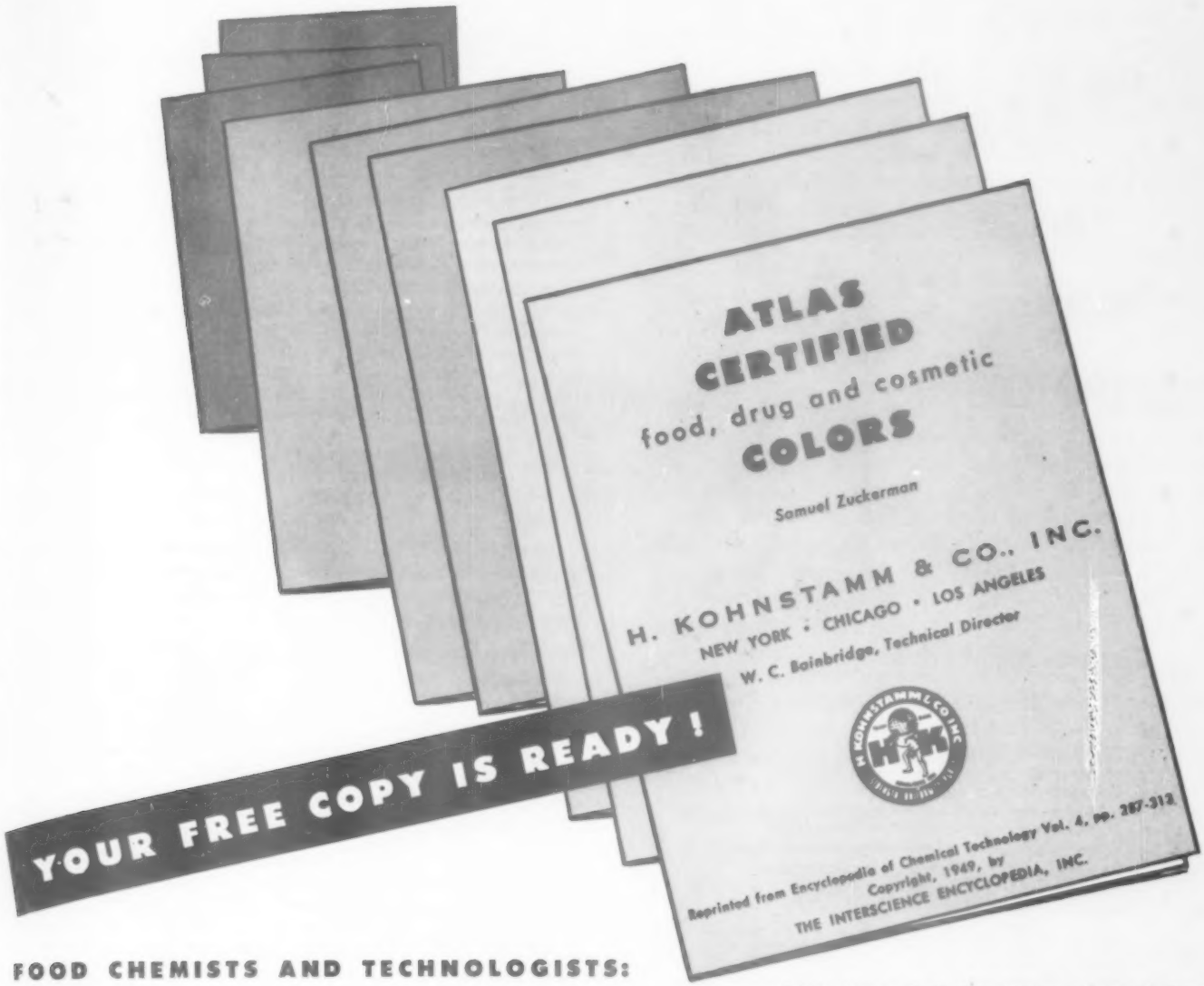
SUGARS

178J. Relative sweetness.

MONCREIFF, R. W. *Flavours, 11,* No. 6, 5-11 (1950).

Part II: Sugar. Absolute rating impossible because apparent sweetness varies with concentration, method of testing, etc. One rather widely accepted listing is fructose (sweetest) sucrose, glucose, galactose, mannitol, lactose. The sweetness of fructose and sucrose, relative to others, decreases as concentration increases. Part III: Other Sweetening Agents. Many α-amino

(Continued on 3rd cover)



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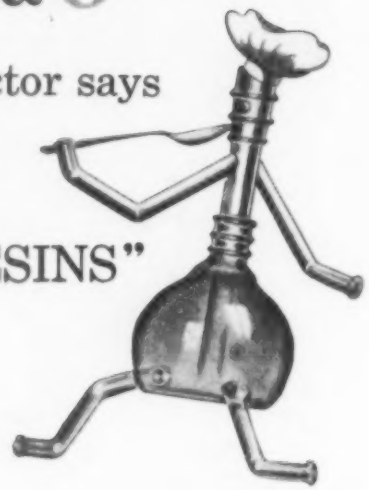

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Selected Abstracts

ANALYTICAL METHODS

181J. A simple universal dairy products phosphatase test.
KOSIKOWSKY, F. V. *Science, 110,* 480-1 (1949).

Dairy product samples are incubated with a sodium carbonate-sodium bicarbonate buffer substrate at pH 9.5-9.7 for a period of time, then the protein precipitated with an acid precipitant. After filtration, the filtrate is brought back to an alkaline reaction with carbonate, and 2, 6-dibromoquinonechlorimide is then added. Blue color is produced if sufficient phosphatase was present in the milk during incubation to split the added disodium phenyl phosphate in the buffer substrate. For ripened cheese, the color development procedure is the same, except that 1 ml. of 10% Calgon solution is substituted for 1 ml. of the copper sulfate-Calgon solution.

182J. Colorimetric determination of reducing sugars with triphenyltetrazolium chloride.
MATTSON, A. M., AND JENSEN, C. O. *Anal. Chem., 22,* 182-5 (1950).

A convenient method for reducing sugars based on reduction of triphenyltetrazolium chloride to triphenylformazan. The product is a red water-insoluble compound which is measured colorimetrically in pyridine.

183J. Determination of water in glycols and glycerol.
JORDAN, C. B., AND HATCH, V. O. *Anal. Chem., 22,* 177-9 (1950).

A method has been developed for determining the percentage of water, by volume, in glycol-water or glycerol-water solutions. The procedure is a reflux distillation and salting-out process. 1-Butanol was selected as a refluxing medium. This solvent forms an azeotrope with water, but not with glycol or glycerol, and is capable of breaking the hydrates which are formed in aqueous glycol solutions. Forty samples of known composition, varying in water content from 1 to 95% were analyzed. The method was found to be reliable and accurate. It is also applicable to mixed glycol-water solutions and mixtures of glycols with glycol-ethers and/or 1-butanol and alcohols containing more than four carbons. The method is especially applicable to permanent-type antifreeze solutions. It works equally well for new or used antifreeze solutions, with no interference from inhibitors or inorganic impurities.

184J. Determination of sealing strength of paraffin wax.
FUNK, C. S. et al. *Anal. Chem., 22,* 179-82 (1950).

This test method permits the determination of sealing strength of different grades of paraffin waxes, and values can be correlated with results found in commercially waxed paper. With usage a minimum sealing strength can be established that will result in satisfactory seals for bread-wrap paper.

BIOLOGICAL SCIENCES

NUTRITION

185J. Concentration of the unidentified growth factor in condensed fish solubles.
KING, R. H., AND HAUGE, S. M. *Arch. Biochem., 24,* 350-7 (1949).

Condensed fish solubles contain an unidentified rat-growth factor distinct from the chemically defined vitamins and amino acids. The factor is distinct from vitamin B_{12} and unidentified growth substances in distiller's dried solubles. The factor is soluble in water, in ethanol, and in mixtures of acetone, ethanol and water, is insoluble in ether and in chloroform, is not adsorbed by Fuller's earth, is readily adsorbed by and eluted from Florisil, and is not precipitated by lead. A concentrate of the factor has been obtained which is active at a level of 2 p.p.m. in the diet. This factor is probably responsible for the growth-stimulating effect of condensed fish solubles upon rats and chicks.

(Continued on page 6)

Regional Section News

PHILADELPHIA SECTION

The May meeting was held as an outing, ladies' day and a dinner at the West Chester Golf and Country Club. Wyeth and Co. afforded those attending the meeting the opportunity of visiting the company's penicillin production facilities.

Mr. G. Raymond Rettew, managing director of Wyeth's West Chester Laboratories talked on "Food in a Tank." His interesting talk was illustrated by pictures and demonstrations.

GREAT LAKES SECTION

At the annual business meeting on April 14th and at the Executive meeting on the same date, considerable thought was given to the place of the National meeting in 1952. It all boiled down to the fact that Mackinac Island's Grand Hotel cannot accommodate the 1500 expected to attend; exhibition facilities are also inadequate. Detroit hotels cannot provide exhibition facilities, and there are too few resident IFT members in Detroit to help with the meeting. It was recommended that Grand Rapids be considered, for there is the necessary hotel space available, and exhibitors prefer Grand Rapids. Maybe you can pick up some of that famous furniture cheap, too.

FLORIDA SECTION

The May meeting was held on the 8th at the Citrus Experiment Station at Lake Alfred. Two motion pictures were shown, the first, "Treasure Island," dealt with Dole's pineapple operation; the second, "Vitamin Rivers," told of the processing of fruit and vegetable juices, and was loaned through the courtesy of the American Can Co.

Following are the officers recently elected for 1950-51:

Chairman: W. R. Roy, Minute Maid Corp., Plymouth.
Vice-Chairman: J. A. Woerz, Continental Can Co., Tampa.
Secretary-Treasurer: F. W. Wenzel, Citrus Experiment Station, Lake Alfred.
Section Councilor: D. W. Riester, American Can Co., Tampa.
Executive Committee: Roger Patrick, U. S. Citrus Products Sta., Winter Haven; T. W. Kew, U. S. Citrus Products Sta., Winter Haven; G. N. Pulley, P. O. Box 13, Winter Haven, and R. L. Miller, 701 S. Hyer St., Orlando.

OHIO VALLEY SECTION

The Spring meeting was held on May 6th at Lancaster, Ohio and attended by 84 food technologists and guests. In the morning, the group toured one of Anchor Hocking's glass plants. The theme of the afternoon program was food packaging:

"Tin Plate and Food Preservation," G. C. Jenison, Weirton Steel Co.
"Papers and Films as Related to the Packaging Industry," John Rote, Standard Cap and Seal Corp.
"Organic Coatings for Metals Used in Food Packaging," C. J. Camp, Anchor Hocking Glass Corp.
"Uses of Aluminum in Packaging," P. C. Althen, Aluminum Company of America.
"Glass and its Role in Packaging," W. B. Snell, G. M. Stuntz, Roger Dubble and Alex Hart, Anchor Hocking Glass Corporation.

Following dinner and entertainment George F. Garnatz, Kroger Company, addressed the group on "Experience with Large Consumer Panel for Gauging Product Acceptability."

Following the technical session the group, in its business meeting, elected the following officers for 1950-51:

Chairman: H. D. Brown, Ohio State University
Vice-Chairman: A. J. Glazier, The Kroger Co.
Secretary-Treasurer: Dorothy Culler, Ohio State University.
Councilor: N. H. Volle, The Kroger Co.
Executive Committee: Fred Deatherage, Ohio State University, and H. J. Alleman, Proctor and Gamble.

DIXIE SECTION

Knoxville, Tennessee was the site of the Spring meeting and banquet held on April 21. Preceding the meeting, an inspection trip was made of the Winter Garden Company's fruit and vegetable processing plant and the Tennessee Valley Authority's floating food research laboratories anchored in the Tennessee River. The program of the meeting featured a question and answer section by W. E. Booker, President, Winter Garden Co., and a short talk on standards of quality for processed fruits and vegetables by Mr. John Wegener of the Food Processing Section of the TVA.

Officers elected for the 1950-51 year were John J. Powers, Chairman; Richard D. Haynes, Vice-Chairman; and T. W. Kethley, Secretary-Treasurer.

The spring meeting was well attended by 50 people from the states of Tennessee, Georgia and Alabama.

MOHAWK VALLEY SECTION

A dinner and meeting was held on April 24th at the Canajoharie Hotel, Canajoharie, New York. Dr. George Hucker of the New York Agricultural Experiment Station, Geneva, the scheduled speaker, was unable to attend. Dr. Richard Henderson rose to the occasion and discussed his work at Syracuse University, on the activities of some of the wood rotting fungi and a possible employment of these fungi for the conversion of waste products containing cellulose to useful substances of potential value as cattle feed.

WESTERN NEW YORK SECTION

The annual spring meeting of the Section was held in the Empire Room of the Hotel Powers at Rochester, New York on May 5th. The afternoon session consisted of the following papers:

Some Fundamental Aspects of Starch Chemistry Having Application to Food Problems. C. W. Bice, R. T. French Co., Rochester, N. Y.
Effect of Emulsifiers on Shortening Performance. Noel H. Kuhrt, Distillation Products, Rochester, N. Y.
Measurement of Color in Tomato Juice. Willard B. Robinson, N. Y. Agricultural Experiment Station, Geneva, N. Y.
Effect of Types of Fat on the Structure of Batters and Cakes. Alice M. Briant, College of Home Economics, Ithaca, N. Y.

There was a dinner at 6 P.M., the speaker being Dr. Charles N. Frey, Director of Scientific Relations, Standard Brands, Inc., New York City. Dr. Frey's subject was "Research in the Food Industry in the United States."

TEXAS SECTION

The April meeting was held on the 3rd at Houston in the tap room of the Gulf Brewing Co. Speaker of the

(Continued on page 5)

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I. F. T. EMPLOYMENT SERVICE

In the interest of bringing together organizations seeking the services of food technologists, and food technologists seeking new positions, the Council of the Institute has established the service outlined below.

A. Organizations in the food and allied industries may run notices of positions open in food technology and no charge will be made for this service. Notices will appear over code numbers and replies will be forwarded promptly to the firm running the notice. In no case will the identity of the firm be revealed. To take advantage of this service simply write to the Executive Secretary of the Institute of Food Technologists, 176 W. Adams St., Chicago 3, Illinois, describing briefly the position that is open. Notices received before the 10th of any month will appear in the next issue of FOOD TECHNOLOGY, published on the 5th of the following month. Notices received after the 10th will appear one month later. All that is asked is that the firm or organization running the notice acknowledge to the applicant each application received. Should the position not be filled by one insertion the same notice will be repeated upon request.

B. Members of the Institute seeking new positions may run notices in FOOD TECHNOLOGY at $2.00 per issue. This is about one-fifth the regular space rate. Remittance to cover the cost must accompany the notice. Simply mail your notice with $2.00 to the Executive Secretary.

Notices of positions open or positions wanted will be limited in size to one column inch—approximately 30 words.

Members are requested to bring this service to the attention of personnel directors of their organization.

Wanted, young man to operate laboratory preparing sausage seasonings, compounds for pickling hams, sausage binders, and similar products. Address Box 100, Institute of Food Technologists, 176 W. Adams St., Chicago 3, Ill.

Regional Section News

(Continued from page 3)

meeting was C. E. Lieberman of Gulf Brewing who talked on "Place of Beer in the Diet." Section members toured the American Can Co. plant and also the Gulf Brewing Co. The next day the members toured around Houston.

MARYLAND SECTION

The May meeting was devoted to a consideration of quality control methods and their application to food production and processing. Dr. Amihud Kramer of the University of Maryland, who arranged the program, conducted the sessions and discussions. The afternoon program consisted of the following papers:

Quality Control During Production of Raw Materials. C. H. Mahoney, National Canners Assn., Washington, D. C.

Quality Control During Harvesting and Storage of Raw Materials. J. S. Caldwell, U. S. Dept. Agr. (retired); University of Maryland.

Operational Control in the Plant. Frederick Boland, Schluderberg-Kurdle Co.

Quality Control Instrumentation. A. E. Clawson and E. A. Capelle, Taylor Instrument Co., Rochester, N. Y.

Taste Testing Panels. Elsie Dawson, U. S. Dept. Agr., Beltsville, Md.

Use of Quality Control Charts. H. L. Stier, University of Maryland.

Mathematical Calculations Involved in Statistical Methods. L. D. Calvin, University of North Carolina.

A Specific Example. L. F. Bruns, Crosse & Blackwell, Baltimore, Md.

Evening papers consisted of the following:

Examples of Application. H. A. Hunter, Thomas & Company.

Strawberry Preserves. B. W. Clarke, Crosse & Blackwell, Baltimore, Md.

Whisky. Ted Plant, Calvert Distilleries, Baltimore, Md.

PUGET SOUND SECTION

The first annual banquet of the Section was a dual affair in that the Section wished to focus attention on the food industries of the Pacific Northwest and to emphasize the contributions of food technologists to these industries. There were 175 guests and members attending the banquet, partaking of beverages and food delicacies of the Pacific Northwest. All menu items were donated by local food firms, representatives of which attended as guests. The menu was a gourmet's delight including everything that the tummy craves from appetizers to assorted Washington wines. There was a social mixer prior to the dinner at which time there were hors d'oeuvres and Pacific Northwest drinks: hard, semi-hard and soft.

Dr. T. L. Swenson of Food, Chemical Research Laboratories, Inc., Seattle acted as chairman of the Banquet Committee as well as toastmaster for the evening. Speaker of the evening was Harold D. Van Eation, Director of the Department of Public Institutions of the State of Washington. Outstanding technical, business and civic leaders of the Puget Sound and Pacific Northwest area were invited as guests of honor. There were Raymond B. Allen, President of the University of Washington; Cecil R. Tulley, Executive Vice President of the Northwest Canners Association; Thomas Carter of the State Food and Drug Administration; P. C. Trussel, President of British Columbia Food Technologists; Truman Graves, President of the Seattle Food Brokers Association, Inc.

Entertainment was followed by the distribution of numerous door prizes ranging all the way from table wines to a free haircut.

The evening was indeed a most successful one.

Fritzsche Award Winner Honor Guest at Dinner

Dr. Arie Jan Haagen-Smit, professor of bio-organic chemistry in the biology division of California Institute of Technology, and recipient of this year's annual gold medal-$1,000 Fritzsche Award presented at the 117th National Meeting of the American Chemical Society, was guest of honor at a dinner tendered in his behalf by Mr. F. H. Leonhardt, President of Fritzsche Brothers, Inc., donor of the award. The dinner was given on April 25th in the Colonial Room of the New York Athletic Club.

In response to a toast of welcome offered by Mr. Leonhardt, Dr. Haagen-Smit voiced his great appreciation of the honor that had been bestowed upon him for his investigations into the chemistry of natural products, plant hormones, essential oils and related subjects. He expressed the belief and hope that future researches in the vast and virtually untapped field of plant study throughout the world (scientists now list over a quarter of a million different plants) would eventually yield products of immeasurable value to industry and humanity in general in time to come.

1950 Appert Medal Awarded Thomas M. Rector Posthumously

On Tuesday evening, May 23rd, at the Chicago conference of the Institute of Food Technologists, Col. Rohland A. Isker presented the 1950 Appert Medal as part of a memorial to the medalist: Thomas M. Rector, who died suddenly at Battle Creek, Michigan, on March 31st. Thus has been added another distinguished name —that of Thomas M. Rector—to the roll of outstanding food technologists whose achievements have been recognized by the award of this medal.

PERSONNEL

E. M. Burdick, Director of Research, Texsun Citrus Exchange, Weslaco, Texas, is studying the chemical composition of a yam-like tuber growing wild in Hidalgo County, Texas, to learn if it has any medicinal value for rheumatism; it may be an additional source of cortisone.

Charles W. Kaufman has been named by General Foods Corp. to succeed the late Thomas M. Rector as head of the company's department of research and development. Mr. Kaufman joined General Foods in 1939, was named director of food technology in 1942 and assistant manager of research and development in 1945.

Lloyd K. Riggs, Director of Nutritional Research, National Dairy Research Laboratories, Oakdale, L. I., has been appointed director of the newly-formed division of nutrition and biochemistry of that company.

(Continued on page 14 following technical papers)

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Abstracts

(Continued from page 2)

186J. Vitamin B_{12} and amino acids as supplements to soybean oil meal and cottonseed meal for growing chicks.

RICHARDSON, L. R., AND BLAYLOCK, L. G. *J. Nutr., 40,* 169-76, Feb., 1950.

Soybean oil meal supported a normal rate of growth in chicks when supplemented with a vitamin of B_{12} concentrate equivalent to 10-20 micrograms of crystalline B_{12} per kg. of diet. The cottonseed meal was equal to soybean oil meal when supplemented with vitamin B_{12} and 0.2% of L-lysine. The combination of soybean oil meal and cottonseed meal when supplemented with vitamin B_{12} gave as good growth as did soybean oil meal alone. These data suggest that plant proteins of relatively low value may be used as a source of protein for growing chicks when they are supplemented with soybean oil meal and vitamin B_{12}.

187J. Biological values of six partially purified proteins for the adult albino rat.

MITCHELL, H. H., AND BEADLES, J. R. *J. Nutr., 40,* 25-40, Jan., 1950.

The digestibilities and biological values of six protein sources of widely different nutritional quality (whole egg, egg albumin, beef casein, wheat gluten, and peanut flour) were determined in the adult albino rat by the nitrogen balance method. Four of these proteins were also tested in young growing rats. The digestibility of the proteins does not differ greatly for growing rats, adult rats, and adult humans, but the biological values are quite different for those proteins deficient in cystine-methionine (beef, casein, peanut flour) or in lysine (wheat gluten). It is concluded that the cystine-methionine requirement of the adult rat is more intense than that of the growing rat or adult human, but the lysine requirement is less. The dietary nitrogen requirement for nitrogen equilibrium is of the same order of magnitude for adult rats and adult humans when expressed as mg. of nitrogen per calorie of basal metabolism except for differences in the proportional requirement for cystine-methionine and lysine.

188J. The influence of tryptophan upon urinary nitrogen and amino acid excretion in the rat.

WYKES, A. A., HENDERSON, L. M., AND ELVEHJEM, C. A. *J. Nutr., 40,* 71-80, Jan., 1950.

The feeding of supplementary tryptophan to protein depleted adult rats on tryptophan-free low-protein diets caused a marked decrease in urinary nitrogen excretion, up to a point between 50 and 100 mg. tryptophan per gram of ration. Higher amounts of tryptophan did not alter excretion. Excessive amounts of tryptophan in a diet caused little change in the urinary excretion of tryptophan, threonine, leucine, histidine, methionine, arginine, and proline.

189J. Influence of the amino acid-dextrose reaction on growth of Bacillus polymyxa.

PETERSON, R., ROSE, D., AND LOEB, L. *Canadian J. Res., 27C,* 269-73 (1949).

Growth of *B. polymyxa* over a 72 hr. period was not significantly affected by the brown, fluorescent materials formed by the reaction between dextrose and protein constituents of the media. During the first 24 hours after inoculation, a slight inhibition wax evident in autoclaved yeast extract media, and in casein hydrolysate media to which additional amino acid-dextrose reaction products has been added, but the inhibitory effects were never marked and disappeared with 48 hours.

190J. The utilization of the nitrogen of ammonium salts, urea, and certain other compounds in the synthesis of non-essential amino acids in vivo.

ROSE, W. C., et al. *J. Biol. Chem., 181,* 307-16 (1949).

Rats on diets containing the 10 essential amino acids, each at their lowest level affording maximum growth, did not grow as well as when added nitrogen in the form of ammonium salts, (L) glutamic acid, or urea was included. Presumably, the "non-essential" amino acid synthesis must depend upon a dietary supply of nitrogen exclusive of the essential amino acids.

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Authors of papers intended for publication in FOOD TECHNOLOGY should request from the Editor's office a copy of a booklet, titled "Suggestions to Authors," and see that their papers are in the form specified therein before they are sent to the editor.

The Institute of Food Technologists assumes no responsibility for statements in contributed articles appearing in FOOD TECHNOLOGY. Editorials present only opinions of the writers and do not necessarily reflect policies of the Institute of Food Technologists.

Abstracts

(Continued from page 6)

FOOD PRODUCTS

BAKING AND BAKERY PRODUCTS

191J. Studies of protein foams obtained by bubbling.

THUMAN, W. C., BROWN, A. G., AND MCBAIN, J. W. *J. Am. Chem. Soc., 7,* 3129-35 (1949).

The foaming of protein solutions is of theoretical interest, and also has wide applications in the baking industry. This paper states that: Proteins produce maximum foam somewhat on the acid side of the isoelectric point. This is shown by single bubbles and by frothing for egg albumin (pH 4) and protamine (pH 10). This maximum is enhanced by dissolving the egg albumin in 10^{-3} M acetic acid. If egg albumin is merely dispersed to a somewhat turbid "solution" at pH 5, it does not foam in the range pH 7 to 11. If first dissolved in 10^{-3} M alkali (potassium hydroxide or barium hydroxide) it foams freely in the alkali range. Alkali earth ion or salt greatly promotes foaming in the alkali range, but may minimize it on the acid side.

COFFEE

192J. Acceptance of soluble coffee.

LOCKHART, E. E., AND GAINER, J. M. *Food Res., 14,* 511-15 (1949).

Results indicated a limited "between-brand" preference in soluble coffee; among the better brands of both pure soluble coffee and soluble coffee product, no brand preference was demonstrated. The more acceptable brands of soluble coffee product tend to be preferred to the more acceptable brands of pure soluble coffee. The better brands of both pure soluble coffee and soluble coffee product are about equally desirable as regular dripolator coffee. A "paired-comparison" procedure was employed. Unselected staff members and students at M. I. T. acted as judges.

FATS AND OILS

193J. Polyphosphates as synergistic antioxidants.

WATTS, B. M. *J. Am. Oil Chem. Soc., 27,* 48-51 (1950).

The antioxidant activities of a number of synergists were measured in aqueous fat system at pH values. A group of polyphosphates not previously investigated was most promising of the synergists tried. Orthophosphates were ineffective, but antioxidant activity increased from pyrophosphate through tri and 'heptaphosphate' and finally to the most active 'hexametaphosphate' and Maddrell's salt. Citrate compared with tri-phosphate and pyrophosphate in antioxidant activity; all other synergists tried were less effective than pyrophosphate. Relatively large molar concentrations of orthophosphates interfered markedly with the antioxidant activity of citrate and the higher polyphosphates. The polyphosphates also inhibited rancidity in the presence of added copper and iron but did not eliminate the catalytic effect of the metals. Antioxidant activity of the phosphates in dry fats did not parallel their activity in aqueous fat systems. Properties of polyphosphates which might affect their use as antioxidants in foods are discussed.

MEAT AND POULTRY

194J. Thiamine, riboflavin, and niacin content of turkey tissues as affected by storage and cooking.

COOK, B. B., MORGAN, A. F., AND SMITH, M. B. *Food Res., 14,* 449-58 (1949).

Total loss of weight in cooking was always less in fresh than in stored birds, and less in larger than in smaller birds. Some off-flavors were detected in both fresh and stored turkeys fed rations containing 13 and 18.5% fish meal, and rancidity was noted in several samples from birds fed tocopherol-free diets for several days before slaughter. Vitamin distribution was similar to that found in chicken tissues. Thiamine and riboflavin were more concentrated in leg muscles, and niacin in breast muscles. Except for the liver and breast, which had 10 to 15 mg. %, all turkey tissues contained about the same amount of niacin, four to seven mg. %. Thiamine was more concentrated in heart than in the liver. Riboflavin was found in greatest amount in the liver and heart, one to three mg. % in leg muscle, 0.12 to 0.18; and in breast, 0.09 to 0.11. No significant loss of vitamins occurred in three to nine months' storage at —23° C., except for thiamine in breast and leg muscles of one lot of turkeys. Loss of thiamine in cooking was large, 67 to 82 percent in leg and skin, 38 to 43 percent in breast meat. Riboflavin and niacin suffered 20 to 30 percent losses. Loss of vitamins due to cooking was greater in the roasted turkeys than in the broiled chickens previously studied.

195J. Swiss steaks into freezer and out.

TINKLIN, G. L., et al. *J. Am. Diet. Assn., 26,* 30-3, Jan., 1950.

Paired steaks from Grade A beef rounds cut 1 inch thick, were double wrapped in locker paper, quick frozen, and stored at —10° F. until ready for braising. They were removed from the locker. With increased length of storage time, the total desirability of the aroma, fat, and lean became less, although the scores did not show a consistent decrease. All reheating methods used in this study proved to be desirable from the standpoint of palatability. Reheating in the double boiler resulted in the least change in weight and gave palatability scores comparable to those of the freshly cooked meat, but required the longest time.

VEGETABLES

196J. Germicidal detergents are not needed for washing fresh-picked cucumbers.

FABIAN, F. W., AND ORLOFF, M. D. *Food Ind., 22,* 256-9 (1950).

Tap water or 30-deg.-salometer brine give as effective results as water containing either of the two quarternary ammonium compounds—Emulsept and Roccal. The germicidal detergents effected no greater reduction in total microorganism plate count.

197J. Potato storage and quality of french fries. I. Katahdin.

ALEXANDER, L. M., SCHOPMEYER, G. E., AND ANDERSON, R. B. *Am. Potato J., 26,* 439-45 (1949).

Katahdin potatoes grown in Maine in 1945 and placed in storage in a potato house in Maryland during October of that year were withdrawn at intervals during February and March, 1946, sorted out into 3 lots according to degree of mealiness by a salt-density method, conditioned at 70 to 75° F. (21 to 24° C.) for periods varying from 1 to 91 days, tested for content of reducing sugars by the picric acid coloration method, and french fried. The yield and edible quality of the french fries were determined. After conditioning for one day, potatoes were excessively high in reducing sugars and produced poor french fries. As the period of conditioning was increased, the content of reducing sugars decreased gradually but was not restored to normal. The mealier the potatoes, the more rapidly they desugared, and the higher the yield and the better the edible quality of the french fries. With adequate conditioning, mealy potatoes produced french fries which were rated very good to excellent, and slightly-to-medium mealy, good to very good. Non-mealy potatoes "recovered" less successfully and produced only fair to good french fries. Results suggested that as a conservation measure for Katahdin potatoes which are to be stored at low temperature for later use in french frying, it appears desirable to store mealy rather than non-mealy tubers.

RECENT PATENTS

198J. Method of sterilizing and preserving.

BRASCH, A. Assignor to Electronized Chemicals Corporation, *23,* 195 (Reissue). Feb. 7, 1950.

Method of sterilizing a substance (such as a footstuff or a drug), without developing harmful side effects by bombarding the same with high speed electrons of a velocity equivalent to more than one million volts during at least one very short time period lasting less than 10^{-4} of a second.

199J. Method of treating foodstuffs.

SPENCER, P. L. Assignor to Raytheon Mfg. Co., 2,495,429, Jan. 24, 1950.

In the method of treating foodstuffs, those steps which include: generating electromagnetic wave energy of a wavelength falling in the microwave region of the electromagnetic spectrum;

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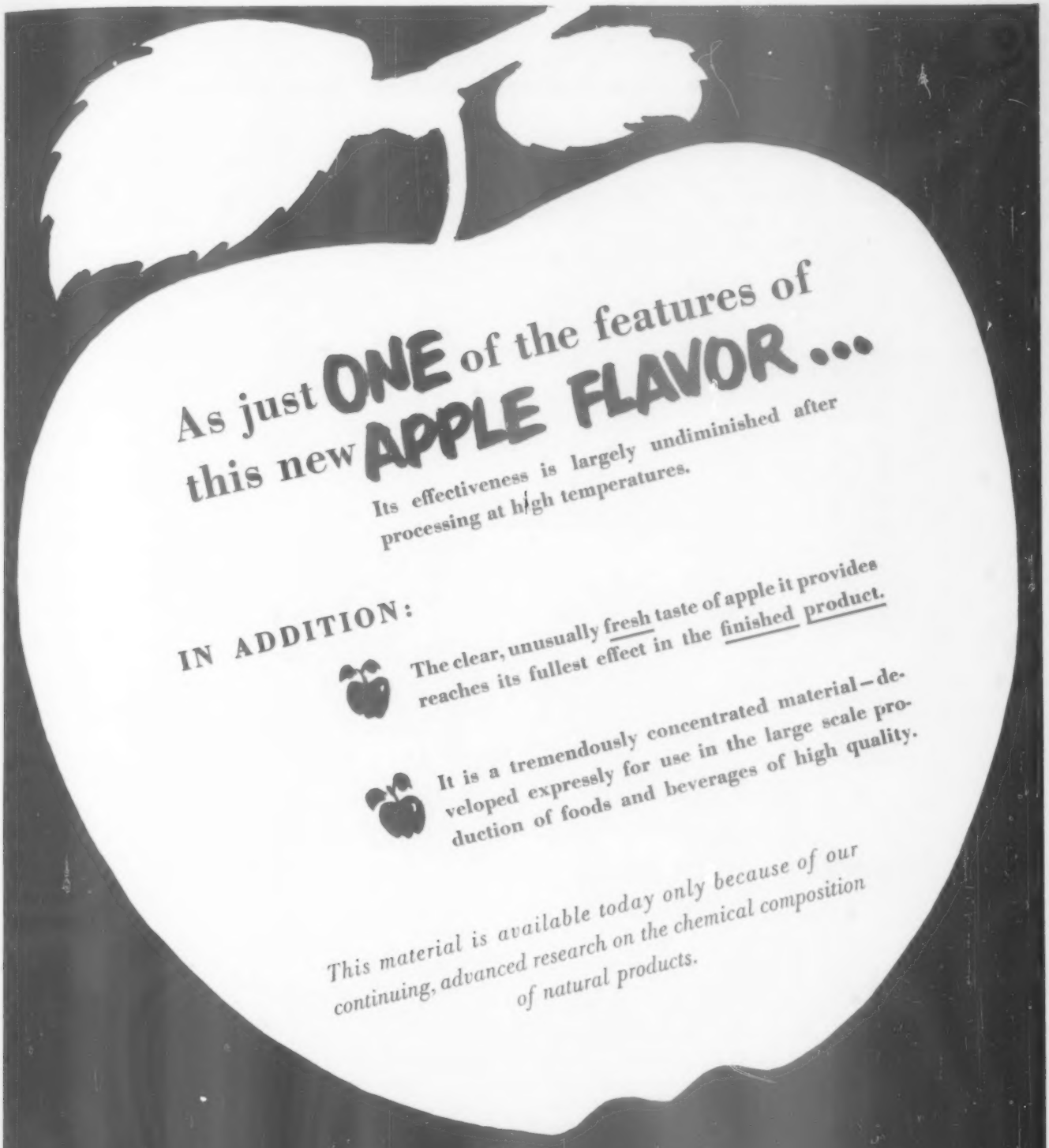

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Welcome to New Journal and to New Editor

The resignation, submitted in January, 1950, by your editor, was accepted by the Council, in session on May 21st in Chicago, Illinois. By action of the Council in the same session, Dr. Z. I. Kertesz of New York Agricultural Experiment Station, Geneva, New York, was chosen to be editor not only of FOOD TECHNOLOGY but also of FOOD RESEARCH. The latter journal, throughout its existence of many years the outstanding journal in its field, published by the Garrard Press and edited by Dr. Fred W. Tanner, has become an official publication of the Institute of Food Technologists. The Institute is pleased to call its own this highly regarded instrument for the spread of scientific information on foods.

Within the next month, the transfer of the functions of the editor's office for FOOD TECHNOLOGY will be completed from the New Jersey Agricultural Experiment Station in New Brunswick to the New York Agricultural Experiment Station in Geneva and the August issue will be produced under the guidance of the new editor.

The Institute is to be highly congratulated on having Dr. Kertesz as editor of its journals. Coming to Geneva in 1929 from the University of Budapest, Dr. Kertesz has achieved distinction in the fields of plant biochemistry and enzyme chemistry. He has published widely and has now in press a comprehensive book on pectins, a subject on which he is an outstanding authority.

The outgoing editor welcomes the new editor and extends sincere wishes for an experience for him as pleasant as was my own experience which is just closing. Success will surely crown the efforts of Dr. Kertesz. Should any assistance be needed, it will be gladly extended.

C. OLIN BALL.

Notes and Letters

Mineral Content of Tomatoes Grown with Different Types of Mulches

Tomatoes are grown extensively in this area of Massachusetts. Practically every home garden contains one or more varieties, and a large tonnage is produced by the commercial market gardeners. As a result, there has been a constant demand for additional information regarding cultural procedures that will give a profitable yield of tomatoes of high food value. The present investigation deals with the influence of mulching on the mineral content of tomatoes. The possible significance of this program and the principal experimental conditions are given in a previous paper *(2)*. Twelve plots were provided for this study—three mulched plots and a control plot, with two replicates of each. The mulches, (a) horse manure, (b) rye straw, and (c) Servall—shredded sugar cane stalks—were applied three inches deep as soon as the standardized strain of Rutgers-Stokes tomato plants were well-established. All plots received a 5-8-7 commercial fertilizer at the rate of 2000 pounds per acre. The tomatoes were grown on a Merrimac fine sandy loam soil that has been described previously *(3)*. During the 89-day growing season, there were 680 hours of bright sunshine, 12 inches of rainfall, and the temperature ranged from 41° to 100° F. Twelve typical tomatoes from each of the twelve plots were disintegrated in a Waring Blendor to a homogenous liquid and assayed for calcium, magnesium, manganese, nitrogen, phosphorus, and potassium by the A.O.A.C. methods *(1)*.

The average amounts of calcium per 100 g. (dry basis) were 203 mg., 186 mg., 218 mg., and 193 mg. for the control, manure, straw, and Servall plots, respectively. The totatoes grown on the straw plots contained the largest amount of magnesium, 276 mg. per 100 g., which slightly exceeded 268 mg. and 254 mg. for the control and manure plots and was larger than the 176 mg. for the Servall plots. Similar amounts of manganese and nitrogen were found in the tomatoes from the experimental and control plots, but tomatoes produced on the plots mulched with horse manure contained more phosphorus and potassium than those grown on the control, straw, or Servall plots. The

(Continued on page 20)

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Abstracts

(Continued from page 8 preceding technical papers)

concentrating and guiding said wave energy within a restricted region of space and exposing the footstuff to be treated to the energy so generated for a period of time sufficient to cook the same to a predetermined degree.

200J. Process of neutralizing pectinic acid.

OWENS, H. S., MCCREADY, R. M., AND MACLAY, W. D. Assignors to the United States of America, 2,495,756, Jan. 31, 1950.

A process of increasing the solubility of a low methoxyl pectinic acid comprising contacting said low-methoxyl pectinic acid in the solid state with gaseous ammonia as a neutralizing agent at room temperature for from 30 seconds to 10 minutes, whereby said acid is neutralized.

201J. Low-methoxyl polyvalent metal pectinate fibers.

OWENS, H. S., AND LOTZKAR, H. Assignors to United States of America, 2,495,757, Jan. 31, 1950.

An artificial fiber having a dry tensile strength not less than about 20,000 lbs. per sq. in. cross section comprising essentially a filament of a polyvalent metal salt of a pectinic acid having a methoxyl content of 3 to 7.9%.

202J. Processing of pineapple juice.

EGUCHI, G. M., AND WELLS, C. H. Assignors to Hawaiian Pineapple Co., Ltd., 2,496,202, Jan. 31, 1950.

Method of treating a raw pineapple juice which comprises introducing minute gas bubbles into a body of the juice, maintained at a temperature above the coagulating temperature of albumin but below the boiling temperature of the juice, at a point below the surface of the body while agitating the body, the agitation being confined substantially to the area of gas introduction, and recovering a froth concentrate of albumin, fruit oil and waxes from the surface of the body.

203J. Process of drying fruit or vegetable materials containing added methyl cellulose.

EDDY, C. W. Assignor to the United States of America, 2,496,278, Feb. 7, 1950.

In the process of preparing free-flowing powders, flakes, and granules by drying fruit and vegetable juices, concentrates, pulps, purees, the step which comprises adding methyl cellulose as a drying aid to the material to be processed and then drying the combined methyl cellulose and material.

204J. Machine for sizing and cleansing asparagus tips.

BELLATO, F. A. Assignor to Bartolomeo Del Carlo, 2,496,516, Feb. 7, 1950.

In a machine of the character described, an endless conveyor, a container pivotally supported on the conveyor, a cover member hingedly secured to the container, means normally retaining the cover in closed position, means actuated during movement of the container for positioning it horizontally, means for momentarily opening the cover to permit a bunch of asparagus to be placed in the container with the tip ends pointing in one direction, means for closing the cover after insertion of the asparagus, a gage plate in the container adjacent the tip ends, means for changing the position of the container from a horizontal to a vertical position with the tip ends of the asparagus lowermost, means for simultaneously imparting a vertical and lateral jolting movement to the container to cause the asparagus to settle until the tip ends contact the gage plate, means for directing a spray of water downwardly through the asparagus to wash the same while they are subjected to the vertical and lateral jolting movement, means for returning the container to a horizontal position, means for cutting off the projecting butt ends of the asparagus, means for discharging the sized asparagus, and means for maintaining the conveyor in continuous movement while the foregoing operations are taking place.

205J. Fortifying feeds.

MELNICK, D. Assignor to Astrol Products, Inc., 2,496,634, Feb. 7, 1950.

A composition for use as a vitamin supplement to furnish the fat-soluble factors in fortifying feeds which comprises in combination: a finely divided base of defatted, enzyme-inactivated soy having distributed there through discrete particles of a high melting physiologically available, edible fat embodying a fat-soluble vitamin, the said fat having a melting point ranging from about 52° C. to about 58° C.

206J. Process for preserving rice.

HARA, T. 2,495,001, Jan. 17, 1950.

The process of preserving rice comprising soaking the rice in a solution of water, salt and sugar, and edible oil for a predetermined period of time at a temperature of approximately 70° F. in an unsealed receptacle, gradually heating the unsealed receptable containing the rice and solution, and cooking the same for a predetermined period of time under steam pressure, after which the pressure is released and the receptacle sealed.

207J. Process for the treatment of masses containing chocolate.

NORDENSKJOLD, T. MALMO, AND HOLMQUIST, K. S. 2,496,557, Feb. 7, 1950.

In a process for the improvement of chocolate masses which includes a conching treatment of such masses, the step which comprises subjecting such masses to the influence of mechanical oscillations with a frequency of the order of at least 15 kilocycles per second.

208J. Gingerbread mix.

SALO, P. W., AND HUBER, L. J. Assignors to General Mills, Inc., 2,496,678, Feb. 7, 1950.

The process of preparing a gingerbread premix which comprises drying flour to a moisture content not substantially in excess of 7%, concentrating molasses to a moisture content within the approximate range of 4% to 10%, mixing the concentrated molasses and the dried flour and thoroughly incorporating the molasses in the flour.

209J. Process of preparing C-vitaminized baking products.

SEEDER, W. A. 2,497,035, Feb. 7, 1950.

A process of producing baked food products enriched in vitamin C for human nutrition, wherein a dough predominantly of cereal flour is prepared and baked to obtain the products, which comprises incorporating water into the dough in a limited amount such that the baked products contain not more than 12% of moisture by weight, incorporating ascorbic acid in concentrated form uniformly into the dough in an amount exceeding 10 mg. per 100 g. of dough, and baking the prepared dough to obtain dry baked products containing in a stable state at least 10 mg. of ascorbic acid per 100 g. of product.

210J. Method for producing oil and meal from fish offal.

NOTEVARP, O. Assignor to Aktieselskapet Stord., 2,497,367, Feb. 14, 1950.

Method of producing fishmeal and oil from fish comprising reducing the moisture content of the fish to the range of 40 to 55% of moisture, pressing the fish material after proper heating to remove a liquid containing the oil and then drying the pressed fish residue.

211J. Flatfish filleting machine.

MEISSNER, C. 2,497,554, Feb. 14, 1950.

In a flatfish slicing machine, the combination of a pair of vertically disposed circular knives positioned in vertical alignment with each other having their edges in slight spaced relation, means resiliently tending to force said circular knives toward each other when in use, a second pair of circular knives horizontally disposed in slight spaced relation to each other, and resilient means engaging and supporting said second knives parallel to the rotating axis thereof permitting the angular deflection of said second circular knives axially of their axes.

212J. Carbohydrate preservative.

BRIED, E. A. Assignor to Hercules Powder Company, 2,497,579, Feb. 14, 1950.

A new composition of matter comprising a carbohydrate and a preservative therefor selected from the group consisting of a stabilized rosin amine and the salts thereof, said preservative being present in an amount within the range of about 0.25 and 10% of the wt. of said carbohydrate.

(Continued on page 15)

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DIXIE, No. 17: Chairman, John J. Powers. Secretary, T. W. Kethley, Engineering Experiment Station, Georgia Institute of Technology, Atlanta, Ga. Councilor, J. G. Woodroof.

TEXAS, No. 18: Chairman, W. C. Scott. Secretary, R. W. Klein, Pan-Am Foods, Inc., Brownsville, Texas.

Membership

Write to nearest regional secretary, if within an area covered by a regional section, or to the Executive Secretary of the Institute, for an application form and information regarding qualifications and classifications.

RESEARCH ON FAT CONVERSION FROM PLANKTON

Anonymous Article published by *Commercial Fisheries Review* 11, No. 5, 37 (May, 1949)

Dr. Richard Harder's pioneer experimentations in the production of fat from oceanic plankton are beginning to assume great importance as a possible source of future nourishment for mankind, according to an April 4 report from the American Consulate at Bremen. Dr. Harder is the dean of the mathematical-scientific faculty at the University of Goettengen. His experiments on the subject, begun during the war and encouraged by the effectiveness of the allied blockade of Europe, have awakened considerable interest in other countries. It may be particularly noticed in this respect that the British Government's Ministry of Food has established an experimental plant for such work at the Microbiological Research Institute at Trinidad.

Plankton, a microscopic type of oceanic plant life, is one of the abundant substances in the sea; it forms the main diet of whales and many fish. Dr. Harder, who is still principally occupied with this problem, is attempting to produce fat directly from the plankton; this would, of course, eliminate the fish or animal as the "middleman" in the production of the fat. He asserts that he has been successful in the basic experimentation. Attempts, however, to utilize his researches for the manufacturing of synthetic margarine and fat, have not yet worked out; Harder is therefore continuing his tests in an attempt to render his processes industrially practicable. No data have been published to date on these researches.—Reprinted in whole—*Commercial Fisheries Abstracts*, December 1949.

WHALEMEAT

Abstract by Maurice E. Stansby of the Fishery Technological Laboratory, Fish and Wildlife Service, Seattle, Washington. Article by Franklin Kidd published in Report of the Food Investigation Board (Great Britain) for the Year 1947, 6 (1949).

During the expedition of the floating factory ship, Balaena, to the Antarctic in 1946-1947, an investigation was made into methods of handling whales for canning for human food. It was found that the usual method of handling whales for making oil led to rapid bacterial decomposition. It was recommended that where whale meat is to be canned for human consumption the Norwegian method of handling the whales be followed. The method consists of bleeding the whales by making an incision in the main blood vessels in the neck. The belly wall is slit to permit sea water to circulate around the intact gut. The meat is kept in good condition when this practice is followed for at least 18 hours and sometimes for 24 hours post mortem.

Analyses were made of certain constituents of the whales. The pigments were found to consist 97 to 100% of myoglobin. Free ammonia was found to rise as the meat spoiled, and a quick method of determining ammonia for use as a freshness test was devised which required only 20 minutes time after sampling.

Commercial Fisheries Abstracts, January 1950.

Regional Section News

(Continued from page 5)

B. W. NIELSON, formerly chemist with the Bureau of Agricultural and Industrial Chemistry's Pasadena, California Laboratory, has resigned to assume charge of Libby, McNeil and Libby's frozen food quality control.

ERNEST C. THOMPSON has retired from the Borden Company after nearly 40 years of service. He entered the company's employ in 1910 as an assistant chemist and was Director of Laboratories from July 1917 until his retirement. For some 20 years he served as chairman of the Standards Committee of the American Dry Milk Institute. In 1946 he received the C. E. Gray Award for his outstanding service in the field of quality control as related to production and quality standards. He is continuing his work as a consultant in food and dairy technology with headquarters at 1792 East 22nd Street, Brooklyn, New York.

ROY H. WALTERS, director of engineering research, General Foods Corporation, has been transferred to the New York Office of the company as technical assistant to the director of research and development.

Meeting of the Council

Proceedings of meeting of the Council, Institute of Food Technologists, held at the Edgewater Beach Hotel, Chicago, May 21, 1950:

The meeting was called to order at 10:00 A.M. by President Fellers.

Present: Forty members and duly authorized alternates.

1. The following reports were received by the Council:

a. REPORT OF EXECUTIVE SECRETARY:

Membership has shown a steady and healthy growth since October 1, 1949. The large number of copies of FOOD TECHNOLOGY returned from the September and October mailings indicated that a complete audit of our membership and circulation lists was in order. This audit was completed in February 13, 1950, and resulted in dropping about 200 errors and duplications found in the lists. The count after these drops was:

Members	2,065
Affiliates	636
Students	85
Non-Member Subscriptions	315
Total Journal Circulation	3,101

On March 4, 1950 the following were dropped from the list:

Deceased (members)	3
Resignations and nonpayment of dues:	
Members	123
Affiliates	74
Total	200

The total dropped during the period October 1, 1949 to March 31, 1950 was approximately 400. The number of new members accepted to April 30, 1950 has more than offset this loss. The count as of April 30th is:

Members	2,111
Affiliates	628
Students	171
Non-Member Subscriptions	319
Total Journal Circulation	3,229

This count is accurate and the lists are apparently correct. There was only one copy of the Journal returned from the April mailing, and that was because the member had moved and left no forwarding address. The new address of this member has since been obtained.

There were in the hands of the Qualifications Committee on April 30th, 50 applications, and new applications are coming in at the rate of about 50 per month. It is desired to pay tribute to the excellent work of Dr. Chace, Dr. Blanck, and Dr. Moyer, of the Qualifications Committee. All applications are now processed within thirty days after receipt by my office, except in those cases where the Committee requests additional information from the applicant, and these cases are quite rare.

It is anticipated that we will show a net gain in members during 1950 of at least 600. Credit for this increase in membership is due Roger Wilson and his Membership Committee. The very attractive letter and folder they prepared and distributed to the entire membership produced most of the new members. If this could be repeated in the fall it is believed that our increase for 1950 will reach 1,000.

The financial status of the Institute is reflected in the following statement, as of April 30, 1950:

ASSETS

Cash, First National Bank of Chicago:		
General Fund	$24,870.88	
Operating Fund	1,878.15	$26,749.03
U. S. Savings Bond Series "F":		
Maturity Value	1,000.00	
Cost	740.00	
Redemption Value 4/30/50		786.00
Accounts Receivable—Garrard Press		275.07
Publications—Back Numbers:		
Inventory at Cost—Per Books	6,029.82	
Less: Reserve for Possible Decline in Value	6,028.82	1.00
Furniture and Fixtures	380.00	
Less: Reserve for Depreciation	95.00	295.00
TOTAL ASSETS		$28,106.10

LIABILITIES

Tax Withheld from Wages	$ 21.00	
Accrued Expenses	46.34	$ 67.34
OPERATING CAPITAL		28,038.76
TOTAL LIABILITIES		$28,106.10

(Continued on page 16)

Abstracts

(Continued from page 12)

213J. Protein preservative.

IVETT, R. W. Assignor to Hercules Powder Company, 2,497,610, Feb. 14, 1950.

An aqueous solution or dispersion of an alkali proteinate containing a preservative for said proteinate selected from the group consisting of a stabilized rosin amine and the salts thereof in an amount within the range of about 0.25% and about 10% of the weight of said proteinate.

214J. Stabilization of eggs.

HALE, C., ELLYN, G., AND SCHAUERT, P. Assignors to Swift & Company, 2,497,817, Feb. 14, 1950.

A process for the treatment of shell eggs which comprises the steps of subjecting such eggs to a heat treatment with a liquid at about 130° F. for about 7 minutes and thereafter subjecting the eggs to a separate heat treatment with a liquid at a temperature of about 136° F. for about 7 minutes, whereby the fresh quality of the eggs is retained to a greater extent than the untreated eggs, bacteria are destroyed, and the albumen is preserved in thick, untinted condition.

215J. Starch treatment.

NEWTON, J. M., AND OUGH, L. D. Assignors to Clinton Industries, Inc., 2,497,838, Feb. 14, 1950.

A method of conditioning starch for enzymic conversion comprising dissolving magnesium phytate in an acid, mixing the solution with an aqueous starch slurry, neutralizing the starch milk to a pH range of 5 to 8 to effect precipitation of the phytate on the starch, and thereafter dewatering and drying the starch.

216J. Infusion package and method of making same.

BAXTER, T. R. Assignor to Standard Brands Inc., 2,498,197, Feb. 21, 1950.

A tea bag, which comprises a sealed web of filter material adapted to hold a quantity of tea, said web being highly permeable and formed of closely interlaced cellulosic fibers and said fibers being bonded by lines of a non-toxic, substantially odorless and tasteless, hot water-repellent lacquer.

217J. Apparatus used in the processing of fruit and vegetable juices and the like.

CROSS, J. A. Assignor to Mojonnier Bros. Co., 2,498,836, Feb. 28, 1950.

In apparatus of the class described, the combination of a vacuum chamber, a liquid supply inlet to said chamber, means in said chamber for fanning out the liquid admitted through said inlet, means for vacuumizing said chamber, diaphragm means for dividing said chamber into an upper part and a lower part, a tubular passageway therebetween, an outlet from the upper part of said chamber communicating therewith at a point just above said diaphragm means, a pasteurized liquid inlet to the lower part of said chamber communicating therewith at a point just below said diaphragm means, flash pasteurizing means taking the liquid from said outlet just above said diaphragm means and after pasteurizing it passing it on to the lower part of said chamber through said pasteurized liquid inlet whereby the gases resulting from said quick pasteurization pass through said tubular passageway into engagement with the fanned out incoming liquid to preheat it, and means for removing the liquid product from the lower portion of said chamber.

218I. Dry pudding compositions and method for preparing the same.

HINZ, H. C., SCHERMERHOR, G. R. SR., AND DORN, F. L. Assignors to American Home Foods, Inc., 2,500,179, Mar. 14, 1950.

A composition for producing a pudding comprising a dry, gelatinized starch prepared by mixing a pudding starch with sufficient sugar to form a frangible product when dried, a chemical gelatinizing agent, and water, which is heat dried and then comminuted to fine grain size, together with a flavoring agent.

219J. Antioxidant.

HALL, L. A. Assignor to The Griffith Laboratories, Inc., 2,500,543, Mar. 14, 1950.

An antioxidant composition comprising a solution of an antioxidant acid ester selected from the group consisting of esters of ascorbic and gallic acid, which ester is soluble in propylene glycol.

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MEETING OF THE COUNCIL

(Continued from page 14)

It is desired to call attention to the large stock of back numbers now on hand. This is more than will ever be disposed of at the present rate of sales. This account will be depreciated by approximately 50% before the next annual meeting. An analysis of the account from November 1, 1949 to April 30, 1950, is as follows:

Inventory November 1, 1949	$5,703.00
Purchase and press overruns, Oct. 1, 1949 to April 30, 1950	710.11
TOTAL	$6,413.11
Total sales Nov. 1, 1949 to April 30, 1950	383.29
Balance on hand April 30, 1950	$6,029.82

This shows a net gain in Inventory of $326.82. Press overruns have been reduced to approximately 125 copies per issue. At the present rate of sales this will be ample to meet demands for an indefinite period. The present procedure of beginning a new member's subscription with the next number of the current volume eliminates the necessity for large overruns and is working out satisfactorily. Of the last 300 new members accepted only one requested that his subscription begin with the first number of the current year.

The sale of single copies and back numbers of Volume III and subsequent volumes at 75c per copy is causing the Institute a net loss of about 25c on single copy orders, and about 10c per copy on larger orders. The Council will be requested to authorize increasing single copy and back number prices to $1.00 domestic and $1.15 foreign.

CHARLES S. LAWRENCE
Executive Secretary

b. REPORT OF TREASURER:

Statement of Receipts and Disbursements
Period Beginning October 1, 1949 and Ended April 30, 1950

	General Fund	Operating Fund	(Elim.)	Combined
BALANCES, OCTOBER 1, 1949:				
(Per Original Transfer)	$14,248.78	$2,500.00		$16,748.78
RECEIPTS FOR PERIOD				
Transfer from General Fund		5,500.00	(5,500.00)	
Dues	8,945.21			8,945.21
Food Technology Periodical	19,949.08			19,949.08
Back Numbers—Periodical	65.64			65.64
Proceeds—Annual Meeting, 1949	5,000.00			5,000.00
Mailing Lists Sold	143.45			143.45
Received for Withholding Tax		21.00		21.00
TOTAL RECEIPTS	$34,103.38	5,521.00		34,124.38
TOTAL—BALANCES AND RECEIPTS	48,352.16	8,021.00	($5,500.00)	50,873.16
DEDUCT—DISBURSEMENTS FOR PERIOD				
Dues Refunds	27.50	101.98		129.48
Discounts and Allowances—Periodical	124.73			124.73
National Headquarters:				
Secretary's Salary	2,800.00			2,800.00
Clerical Hire		1,600.00		1,600.00
Rent		560.00		560.00
Postage, Stationery, Telephone, Telegraph and Miscellaneous	349.31	1,400.64		1,749.95
Office Furniture		40.00		40.00
Travel—Secretary—Cr.	(23.38)	472.77		449.39
Employees' Bond		62.50		62.50
"Food Technology" Periodical:				
Printing and Handling, Mailing and Circulation Expense	10,708.18	309.14		11,017.32
Advertising Commissions	1,787.57			1,787.57
Editor's Office	1,625.73	20.79		1,646.52
Special Appropriation for Brochure		273.70		273.70
President's Office Expenses	428.23	499.04		927.27
Advances—Annual Meeting 1950	165.41	538.29		703.70
Purchase—Back Numbers of Periodical		193.50		193.50
Transfer to Operating Fund	5,500.00		(5,500.00)	
Social Security Tax Paid		58.50		58.50
Withholding Tax—Cr.	(12.00)	12.00		
TOTAL DISBURSEMENTS	23,481.28	6,142.85	($5,500.00)	24,124.13
BALANCES—APRIL 30, 1950	$24,870.88	$1,878.15		$26,749.03

P. K. BATES, Treasurer

(Continued on page 18)

THE CONTROL OF FILLET CONTAMINATION IN FISH PLANTS

Part II. The Relationship Between the Initial Contamination and the Subsequent Rate of Spoilage

Article by C. H. Castell of the Atlantic Fisheries Experimental Station, Halifax, N. S. Published in Fisheries Research Board of Canada, Progress Reports of the Atlantic Coast Stations No. 41, 10 (1948).

Small fillets were very carefully cut from relatively fresh codfish so as to prevent bacterial contamination and stored in sterile glass containers at 38° F. Commercial fillets taken directly from a cutting table in a fish plant were stored in a similar manner. After 6 days the commercial fillets began to develop typical off-odors and amine values indicative of unpalatability. However, after 18 days there was no off-odor from any of the carefully prepared fillets. At 24 days one fillet was badly spoiled and one other fillet had a sour odor. After 40 days, four of the original six fillets still had not developed any observable changes.

There is usually a very definite relationship between the number of bacteria on a fillet and the length of time it keeps; the greater the contamination, the faster it spoils. However, a great many bacteria which spoil fish rapidly at room temperature are unable to grow at refrigeration temperatures. For iced or refrigerated fish, it is the number of "cold-loving" types that determine the keeping time.

The bacteria that are of marine origin, including those bacteria found in the slime and feces of fish, grow rapidly at temperatures that are not very far above freezing. Because of this fact, the largest number of the most active fish spoiling bacteria are brought into the plant on the fish itself. When the number of these low temperature, fish-spoiling bacteria on fresh fillets are reduced by tenfold, the keeping time at 38° F. is increased by approximately one day. Under commercial conditions at 32° F., much better results could be expected that would more than double the comparable keeping time.

To prove that the principal source of bacteria which contaminate and later spoil fresh fish is the slime and feces of the fish itself, twelve small fillets, very carefully cut from fresh

(Continued on 3rd cover)

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Monosodium glutamate is widely used to enhance the mild flavors of poultry, fish, meat products and vegetable dishes where the original flavor characteristics of the food are not to be modified. On the other hand, hydrolyzed vegetable protein, when used in sufficient amounts, adds its distinctive meat broth character and is a dominant flavor in the finished product—meat soups, stews, gravies and highly seasoned meats are typical of such use. However, at lower percentages, the same HVP adds desirable undertones of flavor for greater eating enjoyment without dominating the flavor character of the food. Detailed data and working samples will be supplied for tests on request.

Five years of intensive research preceded the production of the first monosodium glutamate and hydrolyzed vegetable protein by the Huron Milling Company in 1934. Behind every pound of Huron MSG and HVP shipped stands a 50-year record for dependability—dependability both for constant uniformity of products and of service to customers.

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MEETING OF THE COUNCIL

(Continued from page 16)

2. It was moved, seconded and carried that the National Employment Program be handled by the Executive Secretary of the Institute, and that he be authorized to work out the details regarding the allocating of space in FOOD TECHNOLOGY for the insertion of help wanted and position wanted notices, help wanted notices to be run for employers without charge, and position wanted notices to be run for Institute members at a cost of $2.00 per insertion; that an amount not to exceed $250.00 may be expended for circularizing the food industries to notify firms of the availability of this service.

3. It was moved, seconded and carried that the dues for affiliate members be raised to $7.50 per year.

4. It was moved, seconded and carried that the following budget, to cover the year May 1, 1950 to April 30, 1951, be adopted:

PROJECTED EXPENDITURES

NATIONAL HEADQUARTERS:		
Office Rent, Telephone and Telegraph	$ 1,500.00	
Clerical Hire	3,000.00	
Stationery, Printing and Postage	2,500.00	
Office Furniture and Equipment	1,125.00	
Secretary's Salary	4,800.00	
Travel and Miscellaneous	1,000.00	
TOTAL		$13,925.00
FOOD RESEARCH:		
Publishing and Distribution, Jan. 1, 1951 to April 30, 1951		4,000.00
FOOD TECHNOLOGY:		
Printing and Mailing	$21,600.00	
Circulation Expense—Subscription Lists, Addressograph Plates, etc.	1,500.00	
Advertising Commissions	5,400.00	
Agency Discounts	3,240.00	
Cash Discounts	432.00	
Editor's Expense	3,600.00	
TOTAL		35,772.00
PRESIDENT'S OFFICE		600.00
CONTINGENCIES		1,200.00
TOTAL		$55,497.00

PROJECTED INCOME

Members' Dues	$21,000.00	
Student Members' Dues	500.00	
Non-Member Subscriptions to FOOD TECHNOLOGY	2,250.00	
Sale Single Copies and Back Numbers	375.00	
Sale of Mailing Lists	150.00	
Accounts Received for Adv. and Subs.	1,225.00	
Gross Advertising Billing	22,500.00	
Income from Annual Meeting	2,000.00	
Income from FOOD RESEARCH	4,000.00	
Income from Membership Increase	2,400.00	
TOTAL		$56,400.00
CASH ON HAND		25,000.00
TOTAL		81,400.00
ESTIMATED BALANCE ON HAND AT END OF YEAR		$25,903.00

5. It was moved, seconded and carried that in the event a new budget is not approved prior to the expiration of the period covered by this budget, expenditures may be continued at the same rate on a month to month basis until the approval of the next budget.

6. It was moved, seconded and carried that the items of expenditure covering FOOD TECHNOLOGY and FOOD RESEARCH may be increased proportionately as advertising and subscription income exceeds the figures shown under projected income.

7. It was moved, seconded and carried that the publication of FOOD RESEARCH be taken over as of June 1, 1950, but that financial responsibility for FOOD RESEARCH be assumed January 1, 1951, which is the beginning of the new subscription year, details of the transfer and contract for printing to be negotiated with The Garrard Press by the Executive Secretary, said contract to become effective when approved by the President of the Institute; the agreement for taking over FOOD RESEARCH to include the provision that The Garrard Press retain ownership of back numbers to include the current volume; that if at any time The Garrard Press decides to discontinue sale of back numbers, that these would be made available to the Institute at not more than 30c per copy; and that the editorship of the two journals, FOOD TECHNOLOGY and FOOD RESEARCH, be centered in one Editor-in-Chief, with two Editorial Boards, this status to remain until such time as the Editor-in-Chief and Editorial Boards recommend otherwise.

8. It was moved, seconded and carried that the printing over-run of FOOD TECHNOLOGY be held at approximately 200 copies per isue, until such time as experience indicates a change desirable.

9. It was moved, seconded and carried that the subscription rate of FOOD RESEARCH to members of the Institute be $4.50 per year, and that a combination rate for FOOD TECHNOLOGY and FOOD RESEARCH for nonmembers be $12.00 per year.

10. It was moved, seconded and carried that the price of single copies of FOOD TECHNOLOGY beginning with Volume III, January, 1949, be increased to $1.00 domestic and $1.15 foreign.

11. It was moved, seconded and carried that the Executive Secretary be designated Business Manager for FOOD TECHNOLOGY and FOOD RESEARCH, and that he be authoribed to negotiate advertising contracts for both journals, such contracts to be subject to the approval of the President before becoming effective.

12. The Council, with regret, accepted the resignation of Dr. C. Olin Ball as editor of FOOD TECHNOLOGY. The Council appointed Dr. Ball editor emeritus of FOOD TECHNOLOGY, and in expressing their appreciation for his excellent work extended a vote of thanks, and directed that the secretary prepare a suitable letter of appreciation to Dr. Ball and that a copy of this letter be sent to the president of Rutgers University.

13. After due consideration of a number of individuals, the Council, by written ballot, elected Dr. Z. I. Kertesz Editor-in-Chief of FOOD TECHNOLOGY and FOOD RESEARCH.

14. The Council extended a vote of thanks to Dr. Fred E. Tanner, Editor of FOOD RESEARCH for the past 14 years, and directed that he receive a life subscription to FOOD RESEARCH.

15. It was moved, seconded and carried that the 1951 annual meeting of the Institute be held in New York during the week of June 17th.

16. It was moved, seconded and carried that the 1952 annual meeting of the Institute be held at Grand Rapids, Michigan, during the week of June 8th.

17. It was moved, seconded and carried that the 1954 annual meeting of the Institute be held at Los Angeles during the fourth week of June.

18. It was moved, seconded and carried that Charles S. Lawrence be appointed Executive Secretary for the ensuing year.

19. It was moved, seconded and carried that Philip K. Bates be appointed Treasurer for the ensuing year.

20. It was moved, seconded and carried that the President-Elect be empowered to select his committees without Council approval.

21. It was moved, seconded and carried that the Chairman of the various committees of the Chicago Section concerned with the organization and conduct of the 1950 meeting be commended for their excellent work in organizing this convention.

22. It was moved, seconded and carried that the action of the Qualifications Committee in the classification and election of members during the past year be approved. This committee was given a rising vote of thanks for their very fine work during the past year.

23. The Executive Secretary presented the report of the Membership Committee, which showed a net gain of more than 200 members since January 1, 1950.

24. The Texas Food Technologists presented a petition for a Charter as a Regional Section. It was moved, seconded and carried that the Texas Regional Section be chartered as Regional Section No. 18.

25. It was moved, seconded and carried that the Executive Committee be empowered to act for the Council on the petition of the Pittsburgh Section when that petition is submitted.

26. It was moved, seconded and carried that the petitions for Student Chapters be referred to the Executive Committee, with power to act at such time as these groups have complied with the requirements of the Constitution.

27. It was moved, seconded and carried that the President appoint a Committee to investigate the status of the Technical Committees and recommend a future policy.

28. The Maryland Section presented the following resolution:

"BE IT RESOLVED, That the Institute of Food Technologists seek closer cooperation with the Bureau of Agriculture and Industrial Chemistry of the United States Department of Agriculture, by means of a National Committee selected for the express purpose of inviting exchange of views and problems and the dissemination of information to the Institute and its members."

It was moved, second and carried that the Maryland resolution be referred to the board of editors of FOOD TECHNOLOGY for recommendations as to possible action.

29. The reports of the following listed committees were received by the Council:

Committee on Programs, by Lloyd A. Hall, Chairman.

National Publicity Committee, by Milton E. Parker, Chairman.

Committee on Regional Sections, by J. L. Heid, Chairman.

Committee on Student Chapters, by Arthur Levine, Chairman.

Committee on Military Affairs, by R. A. Isker, Chairman.

Committee on Local Arrangements for 1950 Meeting, by Charles L. Smith, Chairman.

Definite action on these reports was deferred until a later date.

30. The Council received the report of the editor of FOOD TECHNOLOGY.

31. The Council received from its Executive Committee a draft of a new Constitution for the Institute and a report from the committee stating that a new Constitution was necessary for two reasons: first, to meet the legal requirements for incorporation, and second, to comply with the provisions of the Internal Revenue Act for non-profit organizations. This Constitution had been prepared by the Constitution Committee, distributed to members of the Council, and their comments requested. Upon receipt of these comments and suggestions the original draft was rewritten by the Committee on Constitutions and then submitted to the Executive Committee. This Committee studied the document in detail, recommended certain changes, and submitted it to the Council. The Articles and Sections of this Constitution were voted on individually by the Council, and the Executive Secretary was directed to prepare a draft of the document as approved for submission to the members, provided such action is approved at the business meeting of the Institute to be held on Wednesday, May 24, 1950.

32. The Council adjourned at 5:30 P.M. Dr. Fellers took advantage of this occasion to express to the Council his appreciation for the loyal and able assistance that he had received during the past year, and especially at this meeting.

CHARLES S. LAWRENCE
Executive Secretary

BUSINESS MEETING
Institute of Food Technologists

Proceedings of annual business meeting held at the Edgewater Beach Hotel May 24, 1950:

President Carl R. Fellers presiding, called the meeting to order at 12:45 P.M.

A quorum was present.

1. The president made a brief statement of the progress of the Institute during the past year, and presented to the meeting the Chairmen of the various committees responsible for the Tenth Annual Conference.

2. The president announced the election of national officers for the coming year as follows:

President-Elect: Dr. Charles N. Frey, Standard Brands.

Councilors-at-Large: Dr. R. Adams Dutcher, Pennsylvania State College; Dr. H. R. Kraybill, American Meat Inst. Foundation; Dr. E. M. Mrak, University of California; Dr. Aksel Olsen, General Foods Corp.; Dr. Carl S. Pederson, New York Agric. Exp. Sta.

3. The president announced the appointment of the following officers for the coming year:

Executive Secretary: Charles S. Lawrence, Chicago.

Treasurer: Dr. Philip K. Bates, Los Angeles.

4. The president presented to the meeting a recommendation from the Council that the new constitution drafted by the Constitution Commitee and approved by the Council, be submitted to the members for mail ballot. It was moved, seconded and carried that this be done.

5. The executive secretary and the treasurer presented brief financial reports at the meeting.

6. The following resolution was moved by Aksel Olsen, seconded by B. S. Clark, and carried by unanimous vote:

"In view of the fact that this is the first annual meeting at which we have had the services of an executive Secretary, and also the first business meeting at which the members have received comprehensive information about the many Council actions which are of interest to all members, and in view of the many other services rendered to the Institute and its members since the executive secretary took office just a few months ago,

"Be It Resolved, That the Institute of Food Technologists extend its sincere appreciation to Colonel Charles S. Lawrence."

7. The meeting adjourned at 2:10 P.M.

Notes and Letters

(Continued from page 10)

values were 616 mg. of phosphorus per 100 g. for the manure-plot tomatoes as compared with 530 mg., 564 mg., and 480 mg. for the control-, straw-, and Servall-plot tomatoes; and 5.4 g. of potassium per 100 g. of tomatoes from the manure plot as compared with 3.0 g., 3.5 g., and 4.0 g. of potassium found in the tomatoes grown on the control, straw, and Servall plots respectively.

Arthur D. Holmes
Robert T. Wetherbee
C. Tyson Smith
William H. Lachman
University of Massachusetts, Amherst.

LITERATURE CITED

1. Association of Official Agricultural Chemists. Official and Tentative Methods of Analysis of the Association of Official Agricultural Chemists. Sixth Ed., Vol. 1 (1945), Washington, D. C.

2. Holmes, Arthur D., Smith, C. Tyson, Rogers, Charles, and Lachman, William H. Effect of different mulches upon the nutritive value of tomatoes. *Soil Sci.*, **65**, 471 (1948).

3. Holmes, Arthur D. Riboflavin content of immature Massachusetts lettuce. *Food Research* **9**, 121 (1944).

PHYSICS OF THE LOW-TEMPERATURE VACUUM DRYING PROCESS. PART I

Article by A. J. Ede, reprinted in part from *Journal of the Society of Chemical Industry* **68**, No. 11, 330 (November, 1949).

An account is given of some of the more purely physical aspects of the process of drying sensitive materials *in vacuo* at a low temperature. A relation is established on theoretical and experimental grounds, between the mean air pressure in the desiccator, the rate of drying, and the difference between the vapour pressures at the evaporator and condenser. Considerations arising from the shape and size of the desiccator, evaporator and condenser are discussed.

The process whereby sensitive materials are dried in the frozen state in a moderately high vacuum is now well established and has been used on a commercial scale for the preparation of dried blood plasma and penicillin. In view of its high cost it has not been applied to foodstuffs to any considerable extent, although the results are in most cases superior to those of any other method of drying, and rival those of quick-freezing. However, good results have been obtained with foodstuffs at higher temperatures and pressures than those usually considered necessary; this paper describes some experiments and observations on the process under such conditions which are independent of the material being dried; a second paper will describe the results obtained with green peas.

The process, as it will be considered here, consists essentially in the sublimation of the ice contained in the frozen material (the "evaporator") and its condensation as a layer of ice upon a cold surface (the "condenser"); it takes place in a vessel known as the "desiccator," the pressure in which is very considerably reduced. The rate of drying is controlled almost entirely by the rate at which the evaporator is heated, since apart from losses due to radiation and conduction, which are very small until the concluding state is reached, all the heat applied must be used as latent heat of sublimation.

In order that the final product shall be of satisfactory quality, an upper limit must be fixed to the temperature of the material at each stage of the process. Since the principal factor influencing the temperature of the evaporator is the vapour pressure around it, one requirement of a satisfactory plant is that the desired rate of drying may take place with a sufficiently low vapour pressure at the evaporator.—*Commercial Fisheries Abstracts*, March, 1950.

FRONT PAGE STORY

THE WALL STREET JOURNAL

May 8, 1950

Chickens Made Tastier By Packer's Injection Of Flavor-Enhancer

• • •

Miami Poultryman Does Trick With MSG; It May Also Be Tried on Steaks, Chops

By John A. McWethy
Staff Correspondent of The Wall Street Journal

CHICAGO—A Florida poultry processor has come up with a new idea for making chickens tastier. He injects a seasoning agent into the dressed birds before marketing them.

Ac'cent!

Eugene D. Ellis of Miami has discovered that an injection of MSG, the centuries-old Chinese flavor-enhancer called monosodium glutamate, will make even a cold storage bird taste better than one cooked fresh from the barnyard.

And apparently chicken fanciers like what he's doing. Before he began using the new process, Mr Ellis' firm, Red Crest Poultry, Inc., sold about 20,000 pounds of chicken a week, now it's selling more than 60,000 pounds a week.

Note this! 300% increase!

Proof Is in the Eating

"To sell Miami grocers on my product," Mr Ellis recounted here the other day, "I bought a portable electric frying unit. I'd persuade the grocer to give me a piece of his choicest chicken. Then I'd fry that along with a sample of mine. I've yet to have anyone dispute that my chicken was the better."

By itself, MSG tastes merely slightly salty but when combined with other foods the saltiness disappears and the natural flavor of the meat, soup or vegetables with which it is used is accentuated.

He "stitches-in" Ac'cent

Taking a leaf from the meat packers, who pump pickling solution into hams through a hollow needle, Mr. Ellis injects an MSG solution containing gelatin into a chicken at six or seven places. Within five minutes, he says, it has spread uniformly through the bird.

Chemical Firm Buys Process

The producers of Ac'cent

The International Minerals & Chemical Corp., the largest producer of MSG, is so impressed with the results that it has hired Mr. Ellis to show other poultry plants around the country how to use the process. They will be permitted to use it without charge.

"We think accenting the flavor of chicken with MSG is the most significant new development ever offered to the $2,226 million poultry industry," says J. R. T. Bishop, International Mineral's vice president. "If it goes over as well elsewhere as it has in Florida, the new process might easily increase chicken consumption 5% to 10%."

Low cost!

International figures one penny's worth of MSG is sufficient to treat a three pound bird, according to Dr. B. F. Buchanan, technical service director. One pound, which sells in quantity for $1.56, is enough for 500 pounds of poultry The machines for injecting MSG into the birds cost about $75—they're the same as the packers use on ham except for a slightly different injection needle. One man can inject MSG into about 2,500 chickens a day, Dr. Buchanan figures.

Simple, quick method!

And here's what the *grocers* did with these extraordinary chickens prepared with Ac'cent

One meat dept. buyer said: "We've never had a complaint on these chickens. We handle them exclusively, and once sold 19,000 pounds in only three days."

The president of a supermarket said: "Our customers like these chickens. We're willing to pay a little more for them. We sell 15,000 to 20,000 a week."

Another meat dept. manager said: "People comment on the appearance of these chickens and their superior flavor. They tell us our birds are the best in town."

HOTELS PRAISE THEM TOO

The meat buyer of a hotel supply company said: "We've never used chickens as fine as these. The hotels we serve are very happy with them." Another said: "Our hotel customers ask specifically for these chickens. They're exceptional."

GET THE FACTS BEHIND THIS STORY!

Let us tell you, at no obligation whatever, about this new method of "stitching-in" Ac'cent for better-tasting, better-looking, better-selling chickens. You'll find it interesting . . . *very* interesting.

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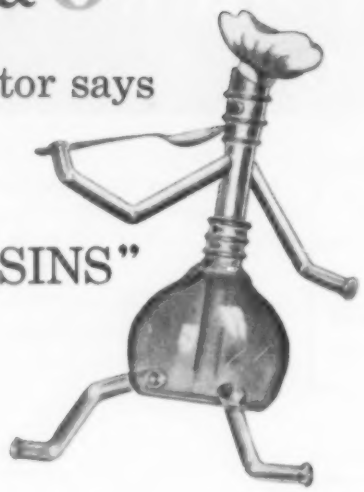

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Book Review

FOOD FOR FIFTY. By Sina Faye Fowler and Bessie Brooks West. Third Edition. John Wiley & Sons, Inc. 1950. Price $4.50.

An interesting handbook for those involved in serving food to larger groups. The book contains quite a few tables of general information, together with quantity recipes covering the entire cuisine. A discussion of menu planning, serving meals for special occasions, and serving teas and buffets, is also included.

J. A. DUNN.

THE HOME BOOK OF FRENCH COOKERY. By Mme. Germaine Carter. Doubleday Inc. 1950. 278 pp. Price $2.95.

This recipe book was written by a French woman during her two years of internment in a German prison camp. She is the wife of the British consul in Pas de Calais. The foreword is written by T. C. Rapp, British Ambassador to Mexico, who was imprisoned with Mme. Carter and her husband. The book includes not only traditional French recipes which were handed down in the author's family but many which she has collected and used for years. Included are recipes for hors-d'oeuvre, soups, entrees, fish and sea food, game and poultry, meats, sauces, pâtés, vegetables, salads, desserts, fruit, ice creams, sandwiches, sweetmeats and candies, and beverages. One chapter, "Menus for All Seasons," gives the menus in both English and French. The menus are "from Mme. Carter's Home."

Although the publisher's description on the dust cover reads "a cookbook which is designed specifically so that the American cook—beginner or accomplished artist—can follow it with a minimum of effort," this is not entirely possible for best results. For example, recipes for pastry call for butter or margarine instead of a hydrogenated fat or lard, and call for baking at 500° F. instead of the usual 450° F. The cooking times given for celery, cabbage, and red cabbage are considerably longer than those considered acceptable in most sections of this country at the present time. Directions are given for *basting* roast turkey, chicken, venison and partridge frequently. Water is to be added to roast chicken. Beef and fish are "boiled."

The "accomplished cook" could easily make corrections for these obviously outdated directions and thoroughly enjoy the many unusual, enticing recipes. "The Home Book of French Cookery" is a book for collectors of special recipe books and is valuable for students of world food customs.

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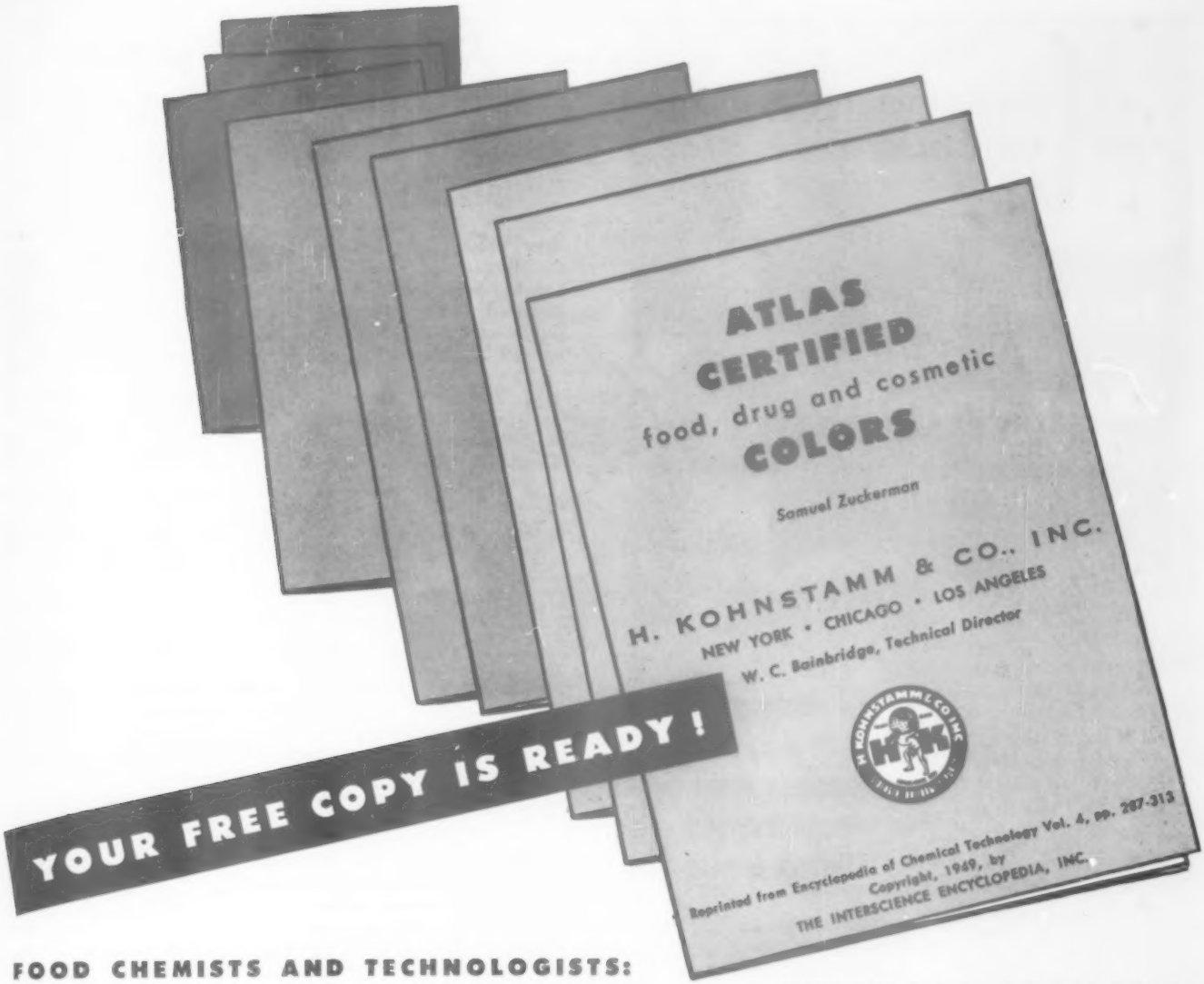
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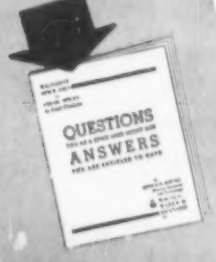

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Selected Abstracts

ANALYTICAL METHODS

220J. Infrared spectra of carbohydrates.
KUHN, L. P. *Anal. Chem., 22,* 276-83 (1950).

The infrared absorption curves for a number of sugars and their derivatives and for some cellulose derivatives have been obtained. Anomeric forms of various glycosides and sugar esters are readily distinguished by their infrared curves, as are the various isomeric sugars and sugar alcohols. Infrared spectroscopy is an excellent tool for the identification of sugars and important functional groups in carbohydrate materials, including cellulose. The possibility of using this tool for quantitative determination of nitrate groups in nitrocellulose has been shown.

221J. The use of glycerol 1,3-dichlorohydrin as a reagent for the determination of vitamin A in oil concentrates.
ANTONIANI, C., FEDERICO, L., AND ARTOM, A. *Olearia, 2,* 405 (1948); *Food Sci. Abst. 21,* 392, 1581 (1949).

A modification in the Carr-Price method for the determination of vitamin A in oil concentrates, in which glycerol 1, 3-dichlorohydrin is used to improve the intensity and permanence of the color obtained with antimony trichloride is proposed.

222J. Chromatographic estimation of carotene in feeds and feed ingredients.
COOLEY, M. L., AND KOEHN, R. C. *Anal. Chem., 22,* 322-6 (1950).

The use of a combination of three solvents (toluene, ethyl alcohol, and ethyl acetate) results in improvement in the completeness of extraction of carotenoid pigments. The method estimates the total concentration of all the known vitamin A-active carotenoids.

223J. The isolation of maltol from heated skimmed milk.
PATTON, S. *J. Dairy Sci., 33,* 102-06 (1950).

Maltol is one of the components formed in skimmed milk as a result of prolonged heat treatment at high temperatures. Maltol concentration produced increases with increasing concentration and heat treatment. The formation of maltol is correlated with browning of the milk and depends upon the interaction of the milk proteins with lactose. The complete lactose molecule is required, neither glucose nor galactose will produce maltol. A method is given for its isolation from heated skimmed milk.

224J. Limitations of the periodate oxidation method for the determination of monoglycerides in fats and oils.
KUMMEROW, F. A., AND DAUBERT, B. F. *J. Am. Oil Chem. Soc., 27,* 100-02 (1950).

Periodate values were determined on a variety of fats and oils before and after saponification by the periodic acid oxidation method of Handschumaker and Linteris. The values obtained indicate that the method is not specific for monoglycerides in natural fats and oils. Therefore previous reports of the natural occurrence of monoglycerides in fats and oils, where the periodate method has been used, may be open to question.

BIOLOGICAL SCIENCES

BIOCHEMISTRY

225J. Liberation of amino acids and peptides from raw and heated bovine plasma albumin by pepsin and trypsin.
RIESEN, W. H., AND ELVEHJEM, C. A. *Arch. Biochem., 25,* 335-46 (1950).

Heat treatment has no effect on the digestibility of bovine plasma albumin by pepsin. Either heating or predigestion by pepsin renders the albumin more digestible by trypsin. Pepsin and trypsin release negligible quantities of free amino acids from raw or heated albumin. In the quantities used for optimum and measurable rates of hydrolysis, pepsin liberates larger quantities than does trypsin of peptides microbiol. active for all amino acids except basic amino acids and tryptophan. Trypsin releases the latter type.

(Continued on page 6)

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Authors of papers intended for publication in FOOD TECHNOLOGY should request from the Editor's office a copy of a booklet, tittled "Suggestions to Authors," and see that their papers are in the form specified therein before they are sent to the editor.

The Institute of Food Technologists assumes no responsibility for statements in contributed articles appearing in FOOD TECHNOLOGY. Editorials present only opinions of the writers and do not necessarily reflect policies of the Institute of Food Technologists.

Abstracts

(Continued from page 4)

226J. Physiological properties of sodium carboxymethyl starch.
WANG, C. C., GROSSMAN, M. I., AND IVY, A. C. *J. Nutr., 40,* 471-81 (1950).

Carboxymethyl starch of a high degree of substitution causes diarrhea when fed to rats in a concentration as low as 5% of the diet and when fed to humans at an average level of 60 grams per day. High concentrations of this material in the diet of rats (45% of the diet by wt.) cause death within one week. Carboxy-methyl starch of a low degree of substitution produces a milder diarrheal reaction. Carboxymethylamylose produces diarrhea more readily than does carboxymethylamylopectin.

227J. A note on the relative rates of reaction of several reducing sugars and sugar derivatives with casein.
LEWIS, V. M., AND LEA, C. H. *Biochim. Biophys. Acta. 4,* 532-4 (1950).

The rates of loss of free amino-N and of browning in mixtures of casein with various reducing sugars at pH 6.3, 70% relative humidity and 25 or 37° C. have been studied. The pentoses, xylose and arabinose reacted most rapidly with the protein amino groups, followed by glucose, galacturonic acid, lactose, maltose, and gluronic acid. Fructose reacted extremely slowly. Browning was most rapid with glucuronic acid, followed by the pentoses, galacturonic acid and glucose. Lactose, maltose and fructose produced no discoloration within the period of the experiments.

MICROBIOLOGY

228J. Quaternary ammonium compounds as sterilizing agents for bacterial spores.
CURRAN, H. R., AND EVANS, F. R. *J. Dairy Sci., 33,* 1-15 (1950).

Eight quaternary ammonium compounds and 2 quaternary-containing detergents were studied in respect to their spore-killing activity in buffer or distilled water solutions. Sporocidal activity increased with temperatures at 30, 60, 80, and 95° C., and with increased alkalinity at pH 6.4, 8.0 and 9.6. Traces of skim milk films decreased sporocidal activity. At 95° C. and pH 9.6 and at a concentration of 1-20, the quarternaries did not kill all of the spores in 30 minutes.

NUTRITION

229J. Studies of the nutritive impairment of proteins heated with carbohydrates. II. In vitro digestion studies.
LOWRY, J. R., AND THIESSEN, R. JR. *Arch. Biochem., 25,* 148-56 (1950).

The autoclaving of moist casein or wheat gluten with dextrose has been shown to give rise to a protein-sugar complex that is digested *in vitro* by pepsin, chymotrypsin and pancreatin, but is resistant to the action of trypsin and papain. It is suggested that the reaction of the sugar with the protein blocks the necessary groups and tryptic activity is no longer possible in the modified protein.

230J. The effect of mineral oil on food utilization. I. Caloric value of food.
PAUL, H. E., AND PAUL, M. F. *Am. J. Digest. Dis. 17,* 55-7, Feb., 1950.

Food consumption and fecal weight records on white rats indicate no caloric loss of food is experienced with the ingestion of mineral oil, and increase in fecal weight from animals receiving mineral oil could be accounted for by weight of mineral oil fed. Levels fed to rats were comparable to described dosage for relief of constipation in humans.

231J. The relation of the amino acid-sugar reaction to the nutritive value of protein hydrolysates.
FRIEDMAN, L., AND KLINE, O. L. *J. Nutr., 40,* 295-307 (1950).

In the presence of glucose, the nutritive quality of protein hydrolysate solutions deteriorates. Extensive decreases in biological value upon drying such solutions are accompanied by "browning" of the preparations. The intensity of the color is to some degree related to the extent of deterioration of the nutritive quality. The reduced biological value results from the reaction of amino acids with glucose. Feeding experiments with pure amino acid supplements indicate that histidine, threonine, tryptophan, phenylalanine, lysine and methionine become unavailable to the animal. Relatively small losses in amino acids as measured by microbiological assay were associated with drastic changes in nutritive value for animals. There appears to be an important difference in the nutritional availability to animals and to microorganisms of the amino acid-glucose reaction products.

232J. The effect of fat level of the diet on general nutrition. V. The relationship of the linoleic acid requirement to optimum fat level.
DEUEL, H. J. JR., GREENBERG, S. M., CALBERT, C. E., SAVAGE, EVELYN E., AND FUKUI, TOMOKO. *J. Nutr., 40,* 351-66 (1950).

Weanling rats fed a diet containing vitamin tested casein as well as sucrose, cellu flour, a salt mixture, and the synthetic B vitamins, developed symptoms of fat deficiency in 12 weeks. The injection of growth hormones in such fat deficient rats did not result in growth, but also did not cause death. A supplementation with 20 mg. of linoleic acid caused a prompt growth response which was not found augmented when level was increased to 60 mg. The injection of the growth hormone combined with the methyl linoleate caused a more rapid growth response. The administration of a 10% cotton-seed oil diet to rats receiving linoleate at an optimum level resulted in further acceleration of growth. This may indicate that the oil possesses some effect other than that of the linoleic acid.

FOOD PRODUCTS

BAKERY PRODUCTS

233J. The effect of temperature and time on cake batters.
GLABAU, C. A. *Bakers Weekly, 145,* 60-3, Feb. 27, 1950.

Part V (conclusion) of a series. Pound cake batters were submitted to 45 minutes bench time at 70°, 80°, 90° and 100° F. before baking. Batters held at higher temperatures produced improved cakes in most respects.

CEREALS

234J. The relation of age and viability to the popping of popcorn.
STEWART, F. C. New York Agr. Expt. Sta. *Bull.* No. 672 (1936).

A quantity of Japan Rice popcorn (some shelled, some on the cob) was stored in a cloth bag in an unheated storm house at Geneva, N. Y. for 14 years. At intervals of 4 to 18 months the shelled corn was tested for viability, moisture content, and popping expansion. The ear corn was tested but once—at the end of the experiment. The germination, which was 100% at first, dropped to 0 at the end of 8 years. The popping expansion of the shelled corn averaged somewhat higher during the first 7 years of the experiment while the corn was viable, than it did during the last 7 years after viability was completely lost. The fact that the moisture content of the corn varied considerably in different tests, and was often below the 13 to 15% required for maximum expansion, makes the results of the popping tests somewhat difficult to interpret. The final tests of shelled and ear corn made under parallel conditions, however, make it possible to draw the following conclusions; (1) Popping quality is entirely independent of viability. (2) Popcorn 14 years old pops nearly or quite as well as at any earlier age. (3) It is still unknown how long popcorn retains its ability to pop. (4) There is some reason for believing that popcorn on the cob retains its poppability better than does shelled corn.

235J. Experiments relating to the spoilage of washed eggs.
MILLER, M. W., JOUKOVSKY, V., AND KRAGHT, A. *Poultry Sci., 29,* 27-33 (1950).

Washing eggs does not necessarily result in the development of rots. Conditions must be such that the egg becomes inoculated with organisms that will develop into rots when favorable environmental conditions are established. Failures of commercial egg washing machines are probably due to the fact that the accumulation of filth and bacteria in the wash water inoculates the egg with rot forming organisms. Eggs can be success-

(Continued on back of following page)

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Abstracts

(Continued from page 6)

fully washed provided the wash water remains sterile, if the egg is not already infected. It will be advantageous to have the wash water warmer than the egg during the washing process. Processing of washed eggs in oil tends to reduce the percentage of black rots that develop but does not prevent the formation of green and mixed rots. Washing of dirty eggs even under the best washing procedures will not entirely eliminate the development of rots, if the eggs have been inoculated prior to washing.

236J. The functional properties and bacterial content of pasteurized and frozen whole eggs.

MILLER, C., AND WINTER, A. R. *Poultry Sci., 29,* 88-97 (1950).

Pasteurization of liquid whole egg at 140-142° F. for 4 minutes killed more than 99% of the standard plate and coliform bacteria. Pasteurization before freezing reduced the viscosity of frozen defrosted whole egg. Pasteurization and freezing increased the stability of whole egg foam as compared with that of the shell egg control, when measured by drainage. The beating time required for pasteurized frozen egg meringue was about 17% longer than for unpasteurized frozen meringue and about 8% longer than for meringue made with shell eggs. Pasteurization and freezing of whole egg had no significant effect on sponge cake volume, crumb color, texture and grain, tenderness, moisture or flavor. There was no significant difference in baked and stirred custards made with unpasteurized and unfrozen, frozen and unpasteurized, and pasteurized and frozen whole egg when judged by stiffness, color, texture, odor and flavor. Shell eggs, frozen egg, and pasteurized frozen egg produced no significant differences in egg scramble when judged by flavor, texture, tenderness and moisture.

FRUIT AND FRUIT JUICES

237J. Acceptance of fresh, frozen, and canned orange juices.

LOCKHART, E. E., AND GAINER, J. M. *Food Res., 14,* 429-33 (1949).

The two high-quality, canned Florida orange juices selected were significantly less preferable than either fresh juice or the two frozen juices tested. There was no significant preference between fresh, unsweetened, Florida orange juice, and the two brands of frozen juice studied. Fifty judges were employed. Paired comparison procedure used.

238J. D.D.T. residue studies of fresh grapes, juice, and jam.

TASCHENBERG, E. F., AND AVENS, A. W. New York Expt. Sta. *Tech. Bull* No. 286 (1949).

DDT spray residues on fresh grapes averaged 7.0 and 10.6 p.p.m. respectively on vines receiving three and four sprays of this material. Juice prepared from treated fruit was apparently free of DDT, but large amounts were found in the pomace. Several lots of grapes treated with DDT under field conditions were processed into jam according to commercial procedure. The steps in processing, beginning with the fresh fruit, are as follows: stemming and crushing, pulping finishing, and jam preparation. Wastes from the pulping and finishing process contained some DDT. Apparently a large amount of the residue is removed in wastes from the finishing machine. Some residue was found in certain lots of the finished pulp. DDT was not found in jam prepared from grapes treated with three sprays. Even with four sprays, one more application than is recommended, no residue was recovered from the jam. The findings on fresh grapes processed immediately after picking were similar to those on grapes frozen for three months before processing. In laboratory experiments, known amounts of DDT were added to finished pulp. DDT was recovered from samples of these mixtures when heated to 210° F. After making the finished pulp-DDT mixtures into jam, only a small portion of the original amount of DDT was recovered.

MEAT AND FISH

239J. Greenish discolorations of sausage.

NIVEN, C. F. *Nat. Provisioner, 118,* No. 10, 17 (1948); *Food Sci. Abst., 21,* 377, No. 1516 (1949).

Some cases of internal greening were observed but greening on the surface of sausages was more common. The latter, with one exception, was due to bacterial contamination of the surface after smoking and cooking. The bacteria responsible are not toxic and only impair the appearance of the sausages. The only bacteria which, in pure culture in the laboratory, caused greening of sausage were *Lactobacillus* and *Leuconostoc.*

240J. Bacteriology of shrimp. V. Effect of peeling, glazing, and storage temperature on bacteria in frozen shrimp.

HOLMES, D., AND MCCLESDEY, C. S. *Food Res., 14,* 401-04 (1949).

The number of viable bacteria in market shrimp was significantly reduced immediately after freezing at —40° C. (—40° F.). The reduction was greater in peeled than in unpeeled shrimp. Storage at —12° C. (10° F.) was more destructive to the bacteria in shrimp than storage at lower temperatures.

SIRUPS

241J. Some factors causing dark-colored maple sirup.

HAYWARD, F. W., AND PEDERSON, C. S. New York Agr. Expt. Sta. *Bull.* No. 718 (1946).

The chief factor in grading the quality of maple sirup is color. Light-colored sirup usually has a more delicate maple flavor than dark-colored sirup. The color of maple sirup depends upon the alkalinity of the sap and the invert sugar content. The extent of color development is limited by concentration of either of these factors and is accompanied by decrease in alkalinity and destruction of reducing sugar. Growth of bacteria causes increased alkalinity and inversion of sucrose, which, in turn, result in darker colored sirup. The bacteria grow even at temperatures slightly above the freezing point and cause significant deterioration in color. Cleanliness of equipment and rapid handling of the sap, therefore, are very important factors in production of high quality, light-colored maple sirup.

PACKAGING

242J. Experience with tin-free cans for vegetable and fruit preserves.

SERGER, H. *Arch. Metallkunde, 2,* 320-2 (1948); *Chem. Abst., 43,* 7602i (1949).

Black iron sheet cans are protected by plastic lacquer with or without previous phosphate coating. For most neutral vegetable preserves such cans, with the necessary manufacturing precautions, are equivalent to tin cans. For acid-containing vegetables only limited storage times are recommended and for fruit preserves, Sn-free cans are not recommended.

243J. Tomato-film findings.

ALLEN, A. S., AND ALLEN, N. *Mod. Pack., 23,* 123-6, Feb., 1950.

A study of the packaging of fresh tomatoes in cellophane and cellulose acetate films. It is concluded that delivery of satisfactory pre-packaged tomatoes can be assured by (1) packaging top quality tomatoes with maximum visibility in the package; (2) using intermediate or high moisture permeable films; (3) providing adequate ventilation of the packages; and (4) maintaining quality at the retail level by rigid inspection.

PATENTS

244J. Method of stabilizing dried starch sirup.

NORDENSKJOLD, T., AND JONSSON, E. A. 2,501,406, Mar. 21, 1950.

A method of manufacturing a dry, powdered starch syrup product, containing as its main ingredient a dried starch syrup composed to a major extent of dextrose and dextrins and made by the hydrolysis of starch, comprising mixing starch syrup and milk and spraying said mixture into a drying tower to convert said mixture directly into a dry powdered condition, and subjecting it to the action of a hot current of air to produce a dry powdered composition directly containing the various constituents of the solids of the starch syrup and the milk substantially unchanged, said final composition being substantially free from the tendency of dried starch syrup to absorb humidity.

(Continued on page 15 following technical papers)

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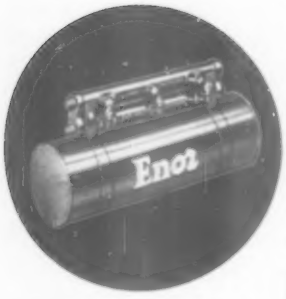

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News of the Institute

PRESIDENTIAL ADDRESS—CARL R. FELLERS

FOOD TECHNOLOGY IN 1950

Where does the Food Technologist stand today? Let us spend a few moments together to take inventory. It is fitting that we should do so at this, our Decennial Annual Conference.

Historical

The profession of "food technologist" began in the period 1910-1920. There are several claimants to the title but A. W. Bitting is generally conceded to be the most formidable contender for being the "first" to carry this title. Other early food technologists are Thomas Rector, Harry A. Noyes, Willard D. Bigelow and Harry Barnard. Still others are Wm. Fitzgerald, Edward M. Chace, William V. Cruess, Samuel C. Prescott, Laurence V. Burton, Frederick C. Blanck and Ernest H. Wiegand. I think that all of these men, at some early date, have been called a "Food Technologist." Of course, to many others of our own generation credit must be given for long and valiant service on the technological front. These men and women may have been primarily engineers, chemists or bacteriologists, both in industry and in teaching, and in research, but all must be given due credit for their advancement of the profession. Your present speaker, like so many others, never bore the title of "Food Technologist," although variously employed as a sanitarian, chemist, bacteriologist, food consultant and teacher. Probably not more than 10 percent of the present 3000 members of our Institute are labeled "food technologists" at the present time. Although the term was "coined" about 40 years ago, it lay in Limbo until resurrected and given respectability by our Institute at the time of its organization 10 or 12 years ago. When one considers the record, the progress of the profession has been rather remarkable. In the last 10 years, the profession has been recognized by name in many places, such as state and federal civil service commissions, government bureaus, universities, canning, freezing and other food industries, by editors in many fields, by the military establishment, by our sister institutes and societies, such as the A.A.A.S., A.C.S., A.S.R.E. and the A.S.H.S. To-day, nearly every scientist and engineer knows approximately what a food technologist does. Do you know what technology means? While at the Pentagon about a month ago on duty with the General Staff, I had to comment on a proposed new Unification Act for the Armed Forces being introduced in Congress. Well, throughout this Act the word "technician" was used instead of "technologist"—so I prepared the usual indorsement, properly defining the two terms, for the signature of a staff officer. Well, to shorten the story—a technologist is one "who possesses systematic knowledge of the industrial arts, especially of the more important manufactures, such as metallurgy, textiles and foods." Another shade of meaning given by Webster is "one who has knowledge of any practical art utilizing scientific knowledge, such as horticulture or medicine; applied science as contrasted with pure science." Our profession has a perfectly good name. I should like to see it more used—especially in its correct sense. I am sure that our profession is on solid ground but we must use caution to avoid slipping in the clay or getting mired in quicksand. By this I mean that we must guard our professional heritage carefully, that is, we must not lower our standards of membership. As is other professions, many who are not qualified or who are unscrupulous will seek to associate themselves with us. A sure way of lessening our present high prestige is to accept into membership all who apply. It is up to every member to maintain the professional standards of his institute.

As I look back on my own experiences, I think that I became aware that food technology was my first love about 1922 while teaching and researching at the University of Washington. I had left industry for University work and was required to teach food technology. All at once, when I began to organize my class material, I realized that there wasn't much material to organize. There were a few ancient and rather worthless books on home food preservation; there was that hardy old perennial "Complete Course in Canning" published by the Canning Trade, a few U.S.D.A. bulletins of early vintage, some German and French works on wine and beverages, John Cobb's famous "Canning of Fishery Products," a few bulletins of the still young National Canners Association, and a very few journals such as "American Vinegar Industry" whose name was later changed to "Fruit Products Journal," "The Canner," "The Canning Trade," "The Pacific Fisherman," "Fishing Gazette," and the "Konserven Industrie." There were a few texts dealing with food chemistry including the A.O.A.C. (much reduced in size as compared to the present 6th edition) and of course the famous old "Zeitschrift für Nahrungs-und Genussmittel" (later the Z. für Unterschungs-Lebensm), and the French "Annales des Falsifications." In the intervening years there have come into existence hundreds of texts and periodicals dealing with various aspects of food technology. The younger generation may think that there was always a generous literature in food science, but it is not so. Furthermore, the literature that was available often dealt in generalities, for writers dared not describe their employee's processes. Business secrets were much more entrenched in those days.

Needless to say teaching food technology before 1925 was not an easy task. One had to rely pretty largely on experience and in applying science to the food business. Food technology was in the making. But it was a challenge and we old-timers like Cruess and Wiegand and Prescott enjoyed it.

And today—what a contrast! There is so much literature on the subject of foods that a man cannot possibly read it, to say nothing of digesting it. Already, we are forced (as the chemists were many years ago) to resort to abstract services of various kinds—Chemical Abstracts, Biological, Nutrition, Refrigeration Abstracts, trade journal abstracts, patent abstracts and

even private abstract services. Where and when is it going to stop? When a group of us decided to start *Food Research* some fourteen years ago, there was some doubt that there would be enough research papers in the field to warrant its publication. For many years more papers have been received than could possibly be accepted—and now we are nearly a year in arrears in spite of the most careful selection of papers, and then cutting them to the bone.

I have been an abstractor for *Chemical Abstracts* for about 25 years. The reason I am an Abstractor is that I noticed that many of the newly started publications dealing in foods were not being abstracted in *Chemical Abstracts*. Promptly, Dr. Crane tagged me for the job. Well, up until 1941, when the war came along, I was responsible for no less than twenty journals, plus all of the Experiment Station bulletins from the 51 states and territories. At present, I think there are nine abstractors carrying on the work that I once did in covering food science literature—and much the same situation exists in *Biological Abstracts*. These abstract journals are time- and life-savers (no pun intended). We should support them in every possible way. Did you know, for example, that every relevant article published in FOOD TECHNOLOGY and *Food Research* is abstracted for Chemical, Biological, Refrigeration and Nutrition Abstracts, and possibly others?

Teaching of Food Technology

The first universities to teach food technology as we define it today were Oregon State College and the University of Massachusetts in 1918. In neither school was there a major course of study for a few years. A number of other universities have taught courses in food technology or its special branches for almost as long as those mentioned, such as California, Washington and Michigan State. Of course, well-organized courses in dairy industry and cereal technology have been offered since 1900, or even earlier. In the past, dairy, cereal and fishery technology have been taught in departments of their own. At present, in some schools, food technology includes all foods; in others all but meats and dairy, and in still others poultry, sugar or cereals are taught in other departments—especially where subjects involving them were taught before the more inclusive "food technology" curriculum was introduced. Some institutions with engineering leanings prefer to use the unit operations method of teaching fundamentals of food technology. Others handle course matter by subjects. Our present teaching of food technology is certainly in a state of flux and change. Old established dairy, cereal, fisheries or meat departments don't like to see a new "food technology" department take over their work. In some cases, dairy departments have expanded to include all other foods. This is a logical process.

The same unit processes and the same basic fundamental principles of producing, processing and distribution are used for foods—whatever the source. In the interest of economy, honesty and reasonableness, the food technology department should include the handling of all processed foods—not a part of them. Rome was not built in a day. Neither will food technology teaching be standardized in a few years. Perhaps, it is just as well that it is not standardized and that some institutions approach teaching the subject from the agricultural or engineering points of view. Others go in for modified chemical or food engineering—still others emphasize vocational subjects. Nearly everybody recognizes the necessity of a well balanced program in science, engineering and agricultural fundamentals, together with applications to processing and management. Every food technologist must realize the inability of schools to crowd into a 4-year curriculum all the subjects considered desirable or even necessary for success in food processing. It cannot be done—even in five years. Our several universities are experimenting with curricula—both undergraduate and graduate. It will take some years, perhaps, to stabilize in some degree the teaching of the subject. We are certainly not ready to recommend for adoption a set course of study for food technology. It seems to me that whatever else we teach, let us not try to compete with our friends and neighbors—the engineer, the chemist, the bacteriologist, the agronomist and the manager. There is room for all. Experience shows that there is need for and a place for the food technologist. It is he who translates the sciences, engineering and management principles that he has learned to the business of food processing. Only in the smaller companies does he come in competition with the chemist, the engineer or the manager.

Food Research

There is little need to discuss this important subject because on research and its applications our food industries depend. Food research has been phenomenally successful. We lead the world. We have more persons engaged in scientific and technological research in foods than all other countries combined. No wonder we have so many students, trainers and visitors from foreign lands to learn the secrets of our success, and our scientific and engineering know-how. Both subsidized research in such agencies as the U. S. Department of Agriculture, Fish and Wildlife Bureau, the Regional Laboratories, our 51 Agricultural Experiment Stations, and private research in the laboratories of our food corporations, large and small, are responsible for reaching and retaining the present leadership of our country and Canada in food teachnology. Still, the amount of private money actually spent for research in the food businesses is pitifully small—probably not more than two percent of the total sums appropriated for operation. Of course, we should not forget the subsidized research, the results of which are available to the industry as a whole. Our Institute with its publications, its Annual Conference and the hundreds of meetings of the 20 Regional Sections has become an important factor in fostering, and in the dissemination of food research.

Our food industries are in a healthy position in 1950. We are fortunate that we deal in a commodity so necessary as food. We need it in good times and in bad times. We spend nearly one-third of our paychecks for groceries. We have an unsurpassed variety of foods to choose from in our stores and markets. Private capital has invested heavily in the food business — it has

(Continued on page 12 following technical papers)

ALUMINUM FOIL AFFORDS MAXIMUM PROTECTION FOR FOODS

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In addition, aluminum foil is highly adaptable to many different types of packaging operations. It is fabricated into all foil-packages, containers and overwraps. And it is combined with other materials in laminated foil packaging to meet the most exacting and varied requirements of the packaged foods and allied industries.

The Reynolds Metals Company has spearheaded the development and advance in all forms of foil packaging. The sturdy, multi-purpose *Reynolds Pak*, a one-piece semi-rigid tray with crimp-on lid, enjoys wide acceptance in many branches of frozen and ready-cooked food packaging and consumer home-freezing operations.

In the broad field of laminated foil packaging, Reynolds has led in the research and development of a great number of combinations of aluminum foil with various types of paper and plastic film. These have been produced to meet the precise requirements of the product to be packaged, as well as those presented by the existing wrapping and sealing equipment of the manufacturer. Thus it is possible to utilize the protective qualities of aluminum foil at acceptable packaging costs.

"*Reyseal*" is the trade name of one such type of Reynolds laminated foil material. It uses wax in the body of the sheet to effect a heat seal at the point where heat is applied. "*Reyseal*" is manufactured in different weights and types. It has proved eminently superior to other packaging materials for many food products, in exhaustive laboratory tests conducted by Reynolds Research Laboratories. Specific products are submitted to rigidly controlled conditions of heat and moisture by Reynolds technicians, to determine the relative protective values of different foil and foil-laminated packaging materials, as against other types. Following is a test case in point:

PRODUCT: A packaged pudding mix.

CONDITIONS: Six weeks at 100° F., 80-85% relative humidity.

MATERIALS:

1. Reyseal "509" carton without liner.
2. Reyseal "509" carton with glassine liner, heat sealed.
3. Reyseal "509" carton with duplex glassine bag.
4. Non-foil carton and liner.

RESULTS: Product in Package 2 maintained freshest odor and best color at end of test period. Cooking tests showed product in Package 2 to be superior in flavor and texture. Package 2 provided six times more protection against moisture than Package 4; Package 3, one and three-fifths times more. Package 1, without liner, proved superior to Package 4, but the differential was naturally less.

RECOMMENDATION: Package 2.

Food product manufacturers and packers are invited to submit product samples for testing. Address requests to:

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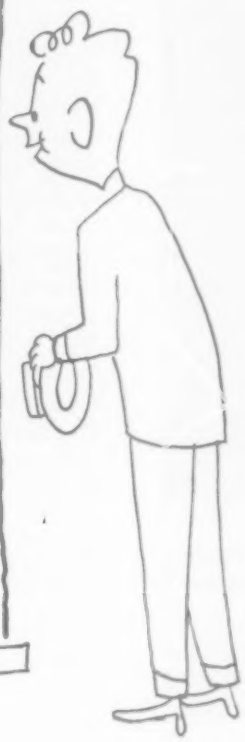

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News of the Institute

(Continued from page 9 preceding technical papers)

stability. As Americans, we eat well—we demand the best in quality and nutrition. In order to give the year-round variety which Americans demand, it is necessary in this climate, to make extensive use of canned, frozen and otherwise processed and prepared foods. This is good for business—good for engineers, good for salesmen and good for food technologists.

In conclusion, may I thank most sincerely my fellow officers, committee workers, employees of the Institute, and the several regional sections and the hundreds of loyal members of the Institute who, by their work encouragement and loyalty, have put the Institute on a solid professional and financial basis. I ask for my successor and his many helpers the same unstinted and loyal support which you have given me during the past year.

I step down now as your President. There is still much to be done, many problems to face but I have full faith that each problem will be solved and that our Institute will go on to greater accomplishment, glory and recognition.

PRESENTATION OF THE 1950 BABCOCK AWARD

On May 22, 1950, during the Tenth Annual Convention of the Institute of Food Technologists, the Babcock Award for 1950 was presented to Dr. Carl R. Fellers of the University of Massachusetts and President of the Institute of Food Technologists. The following are the remarks of Dr. C. G. King of The Nutritions Foundation Inc., of New York, N. Y., who presented the Award to Dr. Fellers:

Dr. Sharp, Professor Hart, Members of the Institute of Food Technologists, and Guests:

The Stephen Babcock Award is a symbol of scientific progress, ideals and responsibility in the food industry. Only one younger generation has been at work in his field of exploration since Professor Babcock opened a few doors to show what a chemist could do to help manufacturers furnish the public with foods of assured composition and nutritive quality.

Surely, we are justified in expecting greater accomplishments in the years ahead, in the development of new and superior foods, when scientists have such advantages as the following:

First: An advancing science of nutrition, so that we may look forward to the day when the composition and functions of food can be measured and understood in terms of *all* the useful nutrients;

Second: A rapidly growing science of genetics, to guide in deliberately planning raw products according to needs, instead of having to wait for genetic accidents;

Third: An industrial product outlet, estimated to reach approximately thirty-two billion dollars per year for consumers in the United States alone in 1950, with more than two-thirds of the world's population still regarded as underfed; and

Fourth: An opportunity to process foods in a myriad of revolutionary ways, using new forms and intensities of radiation, almost any range of temperature and pressure desired, new metals, new plastics, air transportation, and apparently soon to have the advantage of communicating with any part of the world, instantly by sight and hearing.

The recipient of the Stephen Babcock Award well merits the tribute that is extended by the Institute.

Our fellow Charter Member of the Institute, Carl R. Fellers, was a pioneer in studying the critical role that variations in processing can play in controlling nutritive quality. Some 40 of his 185 scientific papers carry reports in that field.

In other areas of technical advance, he guided the introduction of pasteurization as applied to dried fruits (1929), the use of ascorbic acid as an antioxidant (1939), and numerous advances in canning techniques, especially as they apply to sea foods.

One needs only a normal imagination to realize how full his present schedule is, from the fact that in the Food Technology Department, of which he is Head, at the University of Massachusetts, there are 40 graduate students, including 15 from foreign countries, working toward advanced degrees.

In professional organizations, Dr. Fellers has been generous of his time and energy, as shown by his service as Secretary and Chairman of the Food and Nutrition Section of the American Public Health Association, Secretary and Chairman of the Agricultural and Food Chemistry Divisions of the American Chemical Society, an officer in both World Wars, plus 27 years as a reserve officer, and an editorial staff member of at least four technical journals and several technical bulletins. It is a happy circumstance that he is now President of the Institute of Food Technologists.

It is a pleasure, Dr. Fellers, to present this Award to you, in recognition of your contributions to food technology, with special reference to the nutritive quality of foods, and your notable contribution, thereby, to human health.

BABCOCK AWARD ADDRESS

THE SPIRIT OF RESEARCH

CARL R. FELLERS
University of Massachusetts, President, Institute of Food Technologists

Science is organized knowledge. Great reservoirs of human knowledge have accumulated through the ages, century by century, and generation by generation, until now its great bulk fills massive libraries. Mere man is totally incompetent to acquire in a short lifetime more than a mere segment of this vast storehouse of knowledge. Thus, today, unlike Aristotle, or Bacon or St. Thomas Aquinas, those scholastic giants of yesterday, we must confine our feeble efforts in scientific inquiry to relatively narrow spheres of science. Only one hundred years ago we had in our universities Professors of Science, or Professors of Natural Philosophy. Later, as science became more diversified, we had Professors of Natural Science, including Earth Science, Chemistry, Physics and Agriculture, as separated from Mathematics, Philosophy and Astronomy. Let us consider Chemistry for a moment. It is now impossible for a

(Continued on page 14)

Proud of its past record,
THE BREWING INDUSTRY
continues as a leader in the support of
PURE SCIENTIFIC RESEARCH

In his recently published book, "The Yeast Cell—Its Genetics and Cytology," Dr. Carl C. Lindegren, world-famous yeast geneticist, pays high tribute to the Brewing Industry for its honorable record throughout the years in so generously lending its financial support to many outstanding achievements in Pure Scientific Research.

Dr. Lindegren gives this partial summary of brewery-supported research:

> "The Carlsberg Brewery supported Hansen, the inventor of the pure culture technique; Sorenson, the inventor of pH; Kjeldahl, whose nitrogen determination is a byword; and Winge, who brought yeast genetics into being. Joule determined the mechanical equivalence of heat in a brewery laboratory. Modern statistics are based largely on the word of Student, an employee of the Guiness Breweries in Dublin. Beijerink, whom many consider the most penetrating student of the biology of yeasts of the last century, was largely supported by a brewery in Delfth; and his successor, Kluyver, from whose laboratory have come some of the very important advances in enzymology and zymology, has lived up to the standards set by his illustrious predecessor. Henneberg's work was also supported primarily by German breweries, and we are indebted to him for the discovery of food yeast, a source that may one day provide much of the world's proteins and vitamins. Finally, Pasteur's germ theory of disease has its origin in his demonstration that fermentation is caused by micro-organisms. He developed his concept of disease in the course of his successful attempt to discover the cause of spoilage of beer in the French breweries. It is safe to say that very few industries have contributed as much to modern biological thought as the brewing industry."

For more than eight years, Dr. Lindegren and his group of co-workers have engaged in intensive research in the field of Yeast Genetics. In his new book he credits the generous financial support of his laboratory by Anheuser-Busch, Inc., with having made this work possible.

Today, at Anheuser-Busch, a staff of more than fifty scientists is engaged in research which has resulted in the development, growing and harvesting of special yeasts rich in proteins and B-complex vitamins.

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News of the Institute

(Continued from page 12)

chemist to be well versed in all branches of chemistry, for this science has become so diversified and specialized that a lifetime would be spent in acquiring the necessary knowledge and technics of each of the 30 or more branches of chemistry. Similarly, in Agriculture, as late as 1900 we had Professors of Agriculture; now we have great Colleges of Agriculture where perhaps 50 important aspects of the subject are taught and studied. Today, we have perforce become specialists; we have no choice. In his essay on "Criticism," Alexander Pope wrote "One science only will one genius fit, so vast is art, so narrow human wit." A few exceptional men have mastered two or more sciences but it is not the rule. Even a food technologist cannot possibly read the publications that cover his field today, to say nothing of the supporting and related fields of engineering, chemistry, physics, microbiology and agriculture. We skim over lightly the various abstract journals and publications, we can do no more—that is, if we have work to do and a living to earn.

As one by one, I have sent my children to begin the prescribed 16- to 18-year course of study to which they must be exposed in our public schools, I cannot but be reminded of the complexity of life today, of the vast effort each individual must make, and of the years of preparation which are required to attain even average so-called cuture and proficiency. Yet, our schools and universities are a part of the American heritage. When our schools fail for any reason to inculcate knowledge, wisdom and morals, the foundations on which human society rests begin to weaken and crumble. Can this happen in America? Is it happening now? We must be on our guard lest sinister influences wreck and confuse the pliant minds of our youth. Our citadels of learning are just as vulnerable to attack by infiltration and seizure of power as are nations and empires. Let us not forget that Plato once said "The direction in which education starts a man will determine his future life." And learning must not stop when formal education ends, else a man loses out in the ceaseless competition of life among his fellows. Yet, Science marches on. It cannot be stilled. Scientific discoveries have actually created many of the social problems of the present. Science has produced a rapidly changing society which calls for rapid and constant readjustments. For example, most of the occupations of today did not exist a hundred years ago. We have only to think of electricity, automotive transportation, air craft, organic chemicals, modern medicine, petroleum, radio, mechanized agriculture, microbiology and atomic energy. Self-employment lends stability to our economy; industry destroys this stability. True, the standard of living has been gradually improved (according to American standards), but it has been at the expense of titanic economic convulsions and unrest. Apparently, we have lagged behind in our social and economic research. The science of human relationships must be developed parallel to our advances in physical and biological science.

Pure and Applied Science

I, for one, disagree with the usual distinction made between pure and applied science. Long ago, there may have been some possible distinction, but if there was a tangible difference, it has largely disappeared. Could the discoveries of Edison, Marconi or Pasteur be called "pure or fundamental," any more than they were "applied and practical"? Rare indeed is the problem in pure science that is entirely divorced from utility, or possible utility. To state that pure scientists are unconcerned with the practical results of their discoveries, maligns them. Atom smashing and fission have already yielded most practical results — both good and bad. Careful rechecking of the atomic weights of the elements finally demonstrated the presence of isotopes, those most useful tracer elements which already have yielded such practical results in the fields of physiology, and plant and animal nutrition.

Do we study chemistry for the sake of "chemistry" alone, or is it for possible use at some later date? The same deduction holds for physics, bacteriology and for mathematics. True, we require a working knowledge of so-called fundamental sciences in order that we may make use of them in solving the every-day problems which confront us in the profession of making a living. Only teachers of pure science study the sciences for the sake of subject matter alone, and even this is doubtful, because they plan to use the knowledge in their profession, i.e., teaching the subject to others. Indeed, applied science often points the way to needs in pure science. Thus, we may wish to know the physical and chemical properties of a certain alloy, or organic compound, or what happens when A reacts with B. There are many examples of where applied science or research has uncovered the basic problem, and has led to "pure" scientific effort. In fact, it has been said that applied science has now outrun the fund of "pure" theory that is available, and that we need new principles, new theories, new formulas, new hypotheses! However, I suspect that there are still ample practical applications of the profitable use of the "pure" science already available to us. By this statement, I do not decry nor disparage pure science, nor do I underrate its future value. I am simply trying to point out that the so-called differences which some teachers and scientists have made so glibly between the applied and the "pure," have little support in fact.

Meaning of Research

Research has been repeatedly defined. Thus, Kinter states, "Research is the reconnaissance party of industry, roving the unknown territories ahead independently, yet not without purpose, seeing for the first time what all the following world will see a few years hence." Originally, the term "research" typified the more advanced and fundamental character of investigation. Recently, however, the term has been used much more loosely. Advertising of foods and other commodities has brought about a subtle change in meaning of research to the public. Obviously, much of the so-called "research" carried on by some industries, and reported so volubly and without restraint by radio and pen, can

(Continued on page 16)

Abstracts

(Continued from opposite page preceding technical papers)

245J. Preparing vitamin E enriched oil.
McFARLANE, W. D. Assignor to Victory Mills Limited. 2,497,317, Feb. 14, 1950.

The process for preparing a vitamin E enriched oil from wheat germ comprising extracting the wheat germ with a boiling alcohol-water solvent containing 88-92% alcohol; cooling the extract to a lower temperature at which a major portion of the oils extracted from the wheat germ are thrown out of solution, said major portion being of such a nature that vitamin E is substantially insoluble therein; separating the said major portion from the cooled extract; removing the solvent from the cooled extract by evaporation; taking up the resulting residue in hot water and centrifuging to produce a lipoid phase and an aqueous phase, separating and drying the lipoid phase and extracting the same with acetone, separating the extract, and evaporating the remaining acetone from the solution to produce a vitamin E enriched oil containing the bulk of the vitamin E content of the original wheat germ.

246J. Stabilized milk products.
O'LEARY, D. K. Assignor to E. I. du Pont de Nemours. 2,497,320, Feb. 14, 1950.

A product of the group consisting of milk, condensed milk, evaporated milk, and dried milk to which has been added from 0.05 to 1% by weight of a 3-(mercapto) proprionic compound having the linear structural formula $ROOCCH_2CH_2S—X$ in which R is of the group consisting of hydrogen and hydrocarbon groups and in which the monovalent substituent X is an oxygeneated hydrocarbon.

247J. Method of making culinary mixes.
JOHNSON, O. Assignor to Ford, Bacon & Davis, Inc. 2,499,586, Mar. 7, 1950.

A method of making a culinary mix having ingredients comprising flour and shortening in proportions to form an edible culinary product when the mix is mixed with an aqueous edible liquid and baked, which method comprises mixing the ingredients of the mix comprising flour with shortening in a liquid, super-cooled condition.

248J. Method of food preparation.
MARSHALL, L. K. Assignor to Raytheon Manufacturing Co. 2,501,400, Mar. 21, 1950.

In a method of preparing food, the steps of precooking the raw foodstuff, freezing the precooked food, and subjecting the frozen precooked food to microwave energy to heat it to eating temperature.

249J. Concentrated milk food product and process of preparing same.
HOECKER, W. H., AND HAMMER, B. W. Assignors to Golden State Company, 2,501,445, Mar. 21, 1950.

The process of producing a product derived from milk, which is free from cooked flavor, has good keeping qualities at refrigerating temperatures, has a plastic consistency rendering it readily spreadable, has a uniform and smooth texture, and is resistant to any substantial change in viscosity throughout the range of temperatures ordinarily encountered in storage and use, which comprises concentrating whole milk to an extent to produce a total solids content, including butterfat to be subsequently added, of approximately 40% to 70% by weight, adding butterfat in quantity to adjust the ratio of butterfat to milk solids not fat, to a value within the range of approximately one-half of one part to approximately one and three-fourths parts of fat, for one part of solids not fat, heating the concentrated mixture to a temperature of from approximately 150° F. to approximately 190° F. for a period of from approximately one-half a minute to approximately thirty minutes, and then homogenizing said hot mixture before any substantial drop in temperature occurs at a pressure of from approximately 500 pounds per square inch to approximately 3500 pounds per square inch.

250J. Hydrolysis of pectin.
BULMER, H. P. LTD., AND GARRICK, P. Brit. 625,675, July 1, 1949; *Chem. Abst., 44*, 245e (1950).

Pectinic acids, which with sugar solutions, form jellies of high setting power are prepared by hydrolyzing pectin with an alkali at 0-30° under an inert (nonoxidizing) atmosphere and in the presence of an antioxidant (i.e. hydroquinone).

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News of the Institute

(Continued from page 14)

scarcely be dignified by the name in its true meaning. Too often, it is simply the collecting of more or less pertinent data for use by the advertising branch of the firm. I like the definition of research as given by the Office of Experiment Stations, U. S. Department of Agriculture:

"Research as commonly understood, means more than the mere accumulating of data or the compiling of information; it means gathering data for a particular purpose guided by ability to discern the kind of data necessary, to weigh their adequacy, and to interpret them, rather than to merely summarize them. Research is not only an advanced type of inquiry, but a mature effort, dominated by an attitude of intellectual curiosity. It is this mental attitude which impels the investigator to be exacting of himself, to search beyond the empirical information in the attempt to understand obvious facts and occurrences. The under-development of wonder and imagination, or desire to go beyond the superficial and the obvious, retards investigations in certain lines, and makes workers satisfied to follow a set formula of conventions. Such limitations give comparative results good only for the time and place, but not substantial general fact or understanding of relationship between the effect and the cause."

Research means different things to people in different walks of life. American industry does not need to be convinced of the importance of research. On every hand we see what patient fact-finding has done to improve everyday existence. The laborer of today enjoys luxuries denied kings less than 50 years ago, largely through contributions of science to the conveniences of life, which most of us already regard as necessities. The skeptic may tell you that research consists of proving the obvious in a most thorough manner by laborious means. The most fundamental requisite of a research project is the *idea*. A disciplined imagination is at the bottom of every great discovery. The researcher must be looking for something. He may not know exactly what he is looking for, but he knows enough about the situation to recognize the presence of an unsolved problem. A person with an idea and who also possesses a capacity for critical analysis, is at least partially equipped to solve the problem. If, in addition, he is a master of a method or procedure which can be used in the investigation, the chances of success are even more promising. Frequently, however, these two abilities are not associated in the same person. The obvious conclusion, therefore, is that for the most successful prosecution of research, it is necessary to combine the talents of two or more scientists or technologists, so that a fusion of effort may more speedily yield success to the research project. An experienced project leader also greatly enhances the probability of success.

A new fact is a priceless possession and the names of men who have contributed a single important fact to our storehouse of knowledge have been immortalized. However, it is reassuring to know that progress can also be made by the synthesis or collation of well known facts, through deductive reasoning, and through minor improvements, without the painful and slow birth of a new idea.

I cannot emphasize too strongly the value of keen observation in a research worker. This particular faculty should be more carefully cultivated in graduate students and in young workers in science. Keen observation, coupled with sound scientific training, with or without experience, is invaluable. In our daily work we should carefully note the exception, the unusual, the apparent failure or no-compliance with theory or pattern, for these may be the clews to new discoveries. Fleming, as early as 1929, noted the inhibiting effect of *Penicillium* upon *Staphylococcus aureus* when grown on agar plates. I am sure that thousands of bacteriologists, including many in this room, have made similar observations, namely, that molds often interfere with the growth of bacteria in test tubes and Petri dishes containing solid nutrient media. We considered molds as "laboratory weeds," and their occurrence usually due to faulty technics. Some of us even isolated mold enzymes and demonstrated their killing power on bacteria *in vitro*. Wherein did Fleming and Florey differ from all other bacteriologists? Merely in their power of observation and deduction. Thus they argued, if *Penicillium* kills bacteria in a test tube, why not in the human body? As simple as that! Great credit is due the man who first appreciates and demonstrates the application of a discovery. Thus, Fleming and Florey discovered penicillin—one of our most powerful and life-saving antibiotics. Incidentally, their work has directed thousands of scientists to further research in antibiotics, all to the great benefit of the human race. On one man's keen powers of observation and deduction from known facts, rests the whole modern development of antibiotic therapy.

Research is still an open field with opportunity for all — both the brilliant scholar and the industrious plugger. Research builds on foundations already constructed by others who have gone before. Sir Isaac Newton paid a lasting tribute to his predecessors when he said that if he saw a little farther than others it was because he stood on giant shoulders. The challenge is ours to provide the shoulders on which the future investigator will stand, and from which he, in turn, will peer beyond the present horizons of knowledge into the great unknown. That is the spirit of research.

PRESIDENT PAUL F. SHARP ANNOUNCES COMMITTEES FOR THE YEAR

The following committees have been announced by President Sharp. These committees will function for the year ending with the next annual meeting of the Institute:

1. To represent the Institute on the Committee of the American Association for the Advancement of Science: Carl R. Fellers and Harry E. Goresline.

2. *Babcock Award Committee:* E. D. Clark (1951), Charles N. Frey (1951), E. H. Harvey (1951), Alfred J. Finberg (1952), F. P. Griffiths (1952), Fred W. Wenzel (1952), F. C. Blanck (1953), Victor Conquest (1953), W. V. Cruess (1953).

3. *Committee on Constitution:* Aksel G. Olsen, Chairman; Arthur N. Prater, W. L. Campbell.

4. *Committee on Education and Curriculum:* M. E. Highlands, Chairman; Horace Campbell, John L. Heid, Walter A. Maclinn, Roy E. Marshall, Robert W. Pilcher, Herbert N. Riley, George C. Scott, Ernest H. Wiegand.

5. *Committee on Finance:* Philip K. Bates, Chairman; B. S. Clark, Aksel G. Olsen.

6. *Committee on Membership:* Louis B. Howard, Chairman; Charles S. Lawrence, Secretary. Other members will consist of the Chairmen of all Regional Section Membership Committees.

7. *Program Committee for 1951 Annual Meeting:* Charles N. Frey, Chairman; Aksel G. Olsen, W. L. Campbell, Henry R. Kraybill, R. T. Bohn, David B. Hand, Arnold H. Johnson, Mary E. Pennington, Louis B. Howard, B. S. Clark, L. E. Cliffcorn, Bernard L. Oser, Arthur W. Farrell.

8. *Committee on Nominations:* W. Ray Junk, Chairman; George F. Stewart, Frank L. Gunderson, Ray B. Wakefield, B. L. Herrington. And Chairmen of all Regional Sections.

9. *Committee on Publications:* Walter D. Pheteplace, Chairman; John T. Knowles, Philip K. Bates, Carl R. Fellers, George F. Stewart.

10. *Committee on Qualifications:* E. M. Chace, F. C. Blanck, James C. Moyer.

11. *Committee on Regional Sections:* John L. Heid, Chairman; Charles J. Meister W. H. Cook, W. Clifford Scott, Roger V. Wilson, J. G. Woodroof, F. E. Atkinson, J. A. Dunn, Ernest H. Wiegand, R. H. DeWaters.

12. *Committee on Student Membership:* Arthur S. Levine, Chairman; Robert G. Tischer, C. Wilson Eddy, Gerald A. Stout, Oliver J. Worthington, E. M. Mrak.

Communications concerning Committee work, or the availability of individuals to serve as committeemen, should be addressed to the President, Dr. Paul F. Sharp, University of California, College of Agriculture, Giannini Hall, Berkeley 4, California.

President Sharp will announce additional committee appointments at a later date.

Regional Section News

STIRRINGS DOWN UNDER

A group of Australian members of the Institute held a meeting in Sydney on May 29th, preliminary to organizing an Australian Regional Section. Charles E. Norton, American Can Co., was elected provisional president of the group, and Victor M. Lewis, 25 Byron St., Coogee, N. S. W., was elected Secretary. Mr. Lewis reports considerable enthusiasm shown by those present. Tentative times and places were fixed for two further meetings, after which the group will formally apply for a Regional Section Charter. An Australian Section appears to be a certainty before the end of 1950.

HOW ARE YOU GOING TO PACK THEM IN?

At the Section Officers' Breakfast during the 1950 Annual IFT Conference in Chicago, it was brought out that some Sections are having difficulty in getting a good turn-out at their meetings. Some thought that programs should be highly technical and spread information about the latest research developments set forth by outstanding experts. Others were of the opinion that meetings should include inspection tours of plants, laboratories, etc., and that the program should be interesting but not necessarily highly technical, with local speakers discussing their own problems. Considerable success has been achieved by at least one section in tailoring their programs for interest rather than highly

(Continued on page 18)

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TEXAS, No. 18: Chairman, W. C. Scott. Secretary, R. W. Klein, Pan-Am Foods, Inc., Brownsville, Texas.

Membership

Write to nearest regional secretary, if within an area covered by a regional section, or to the Executive Secretary of the Institute, for an application form and information regarding qualifications and classifications.

Regional Section News

(Continued from page 17)

technical matters. Nothing was said about fan or bubble dancers.

NORTHERN CALIFORNIA SECTION

The Section met on June 15th at the New Tivoli in San Francisco, a dinner at 7:00 and the meeting at 8:15. Dr. Karl F. Meyer, Director of the Hooper Foundation for Medical Research and Professor of Experimental Pathology at the University of California Medical School in San Francisco spoke on "World Health." He showed colored pictures of his recent trip to New Zealand and Australia to attend the International Health Conference.

On July 15th an informal outing was held by the members of the Section, at Alum Rock Park, San Jose.

PUGET SOUND SECTION

The Section held its election of officers for 1950-51, by mail ballot. The following were elected for the coming year:

Chairman: James C. Palmer, Federal Food and Drug Administration, Seattle, Wash.

Vice-Chairman: John A. Ardussi, Carl F. Miller and Co., Seattle, Wash.

Secretary: F. Bruce Sanford, U. S. Fish and Wildlife Service, Seattle, Wash.

Treasurer: Joseph L. Bigas, American Can Co., Seattle, Wash.

National Councilor: Charles R. Stumbo, State College of Washington, Pullman, Wash.

Executive Committee: Ray W. Clough, National Canners Assn., Seattle; Clarence W. Hurlbut, Blue Banner Foods, Kent, Wash.; Francis P. Owens, Laucks Laboratories, Inc., Seattle; Max Patashnik, Libby, McNeill and Libby, Seattle.

The Section's activities will be suspended until late September or early October.

PERSONNEL

JAMES A. BERRY, SR. of the Bureau of Agricultural and Industrial Chemistry's Western Regional Research Laboratory at Albany, Calif., and a member of the Bureau's staff since 1929 when he was with H. C. "Dutch" Diehl at the Frozen Pack Laboratory in Seattle, has left to join the National Antiseptic Co., at Olympia, Washington. He contemplates opening a bacteriological laboratory for research and control in the East Bay Region at a later date.

J. STAFFORD ELLITHORP, JR., formerly Vice President of Beech-Nut Packing Co., has been elected president of that company. Another food technologist has achieved the top position in a food processing company.

JAMES W. EVANS, formerly head of the Foods Research Section of General Mills has become director of the research laboratories of American Maize-Products Co., Roby, Indiana.

RIDGWAY KENNEDY, JR., formerly production manager, Abbotts Dairies, Inc., Philadelphia, has been chosen president of that company. He has come up through the ranks through the production of ice cream,

and is well-known for his breadth of view in technical matters.

ROBERT W. KILBURN has resigned from Food Machinery and Chemical Corp., to become Director of Research of the Florida Citrus Canners Cooperative at Lake Wales. He will succeed J. L. Heid who resigned to become General Manager of Golden Citrus Products, Fullerton, California. Mr. Kilburn is a graduate of the University of California (1937). He spent nine years with Treesweet Products Co., at Santa Ana, California before going with Food Machinery, where he was canning research technologist and co-inventor of FMC's chemical steam peeler for fruit.

KARL F. MEYER, Director of the George Hooper Foundation for Medical Research, University of California Medical Center, has made the June, 1950 issue of *Readers' Digest*. We look next for his name in electric lights in a feature Technicolor movie: "Botulinum on the Bounce," or "Squirrels Harbor More Than Nuts."

CARL S. MINER, Director, Miner Laboratories, Chicago, will receive the 1950 Honor Scroll Award of the Chicago Chapter of the American Institute of Chemists "in recognition of his abilities as a chemist and for his long-time efforts in advancing the professional interests of chemists and particularly in awakening and guiding professional attitudes in younger chemists."

LUDVIG REIMERS, Manager, Products Control Dept., Sperry Division of General Mills, and Mrs. Reimers have returned from a vacation tour of the Hawaiian Islands. As tax payers, they saw part of their money go up in smoke when they viewed the crash of the Mars plane from the first whiff of smoke to the last fiery glory.

CLARENCE P. WILSON, Director, Products Department, California Fruit Growers Exchange, retired March 1st after 33 years of service to the California-Arizona citrus industry. Mr. Wilson started his scientific career in 1907 as a scientific assistant in the old Bureau of Chemistry, U. S. Department of Agriculture, coming to California in 1911 as assistant chemist in the Bureau's fruit and vegetable chemistry laboratory on Mission Road in Los Angeles. In 1916 he left the Government to become manager of the Exchange Lemon Products Co., and in 1920 he joined the staff of the California Fruit Growers Exchange as chemist in charge of the Research Department. He became assistant manager of the Products Department in 1929, and ten years later General Manager. In 1944 he became Director of Products Research for the Sunkist Marketing Cooperative. Mr. Wilson's pioneer work in the field of citrus by-products was instrumental in making the Exchange products plants the most complete of their kind in the world.

EVERETT WOLFORD, bacteriologist at the Bureau of Agricultural and Industrial Chemistry's Western Regional Research Laboratory at Albany, California, has been transferred to the Bureau's Pasadena, California, laboratory.

EMPLOYMENT NOTICES

Wanted, graduate chemist for technical service work on food starches. N. Y. City lab. $260-$325 mo. start depending upon experience. State age, education, experience. Box 102, Institute of Food Technologists, 176 Adams St., Chicago 3, Ill.

Wanted, Process Engineer, 27-33 Ch.E. or M.S. Some Food Technology. Experience quality control. Mature thinking, ability visualize plant operations, initiative, personality. Leading N. Y. C. firm. Submit complete resumé, salary. Address I. F. T., Rm. 1532-A, 176 W. Adams St., Chicago 3.

Wanted, College grad; strong Chemistry, English background; prefer experience experimental foods; research laboratory large midwest manufacturing firm; prefer someone living in this area; give full details. Reply Box 103, Institute of Food Technologists, 176 W. Adams St., Chicago 3, Ill.

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I. F. T. EMPLOYMENT SERVICE

In the interest of bringing together organizations seeking the services of food technologists, and food technologists seeking new positions, the Council of the Institute has established the service outlined below.

A. Organizations in the food and allied industries may run notices of positions open in food technology and no charge will be made for this service. Notices will appear over code numbers and replies will be forwarded promptly to the firm running the notice. In no case will the identity of the firm be revealed. To take advantage of this service simply write to the Executive Secretary of the Institute of Food Technologists, 176 W. Adams St., Chicago 3, Illinois, describing briefly the position that is open. Notices received before the 10th of any month will appear in the next issue of FOOD TECHNOLOGY, published on the 5th of the following month. Notices received after the 10th will appear one month later. All that is asked is that the firm or organization running the notice acknowledge to the applicant each application received. Should the position not be filled by one insertion the same notice will be repeated upon request.

B. Members of the Institute seeking new positions may run notices in FOOD TECHNOLOGY at $2.00 per issue. This is about one-fifth the regular space rate. Remittance to cover the cost must accompany the notice. Simply mail your notice with $2.00 to the Executive Secretary.

Notices of positions open or positions wanted will be limited in size to one column inch—approximately 30 words.

Members are requested to bring this service to the attention of personnel directors of their organization.

STABILIZATION AND ANTIOXIDANTS

Article by H. T. Spannuth, published in the *Journal of the American Oil Chemists' Society* **26**, 10, 618 (1949).
Abstracted by Martin Heerdt.

Hydrolytic rancidity is usually associated with butter fat. The odor is attributed to volatile acids, such as butyric, caproic, and caprylic which are liberated through the enzymatic action of lipase. *Ketonic rancidity* has been associated with fats containing C_5 to C_{14} normal saturated acids which are converted to methyl ketone of one less carbon atom. Biological degradation of fatty acids is considered to proceed by beta oxidation to the keto acid, which is then split by hydrolysis to yield an acid with two less carbon atoms; but when the enzymatic activity is impaired, the oxidative process tends to stop short at the beta keto acid. This acid then loses carbon dioxide readily by the action of carboxylase and is thus converted into the corresponding methyl ketone. This type of spoilage has been reported as taking place in anaerobic conditions although the first step is an oxidative one. The ketonic oxidative rancidity is associated usually with mold growth.

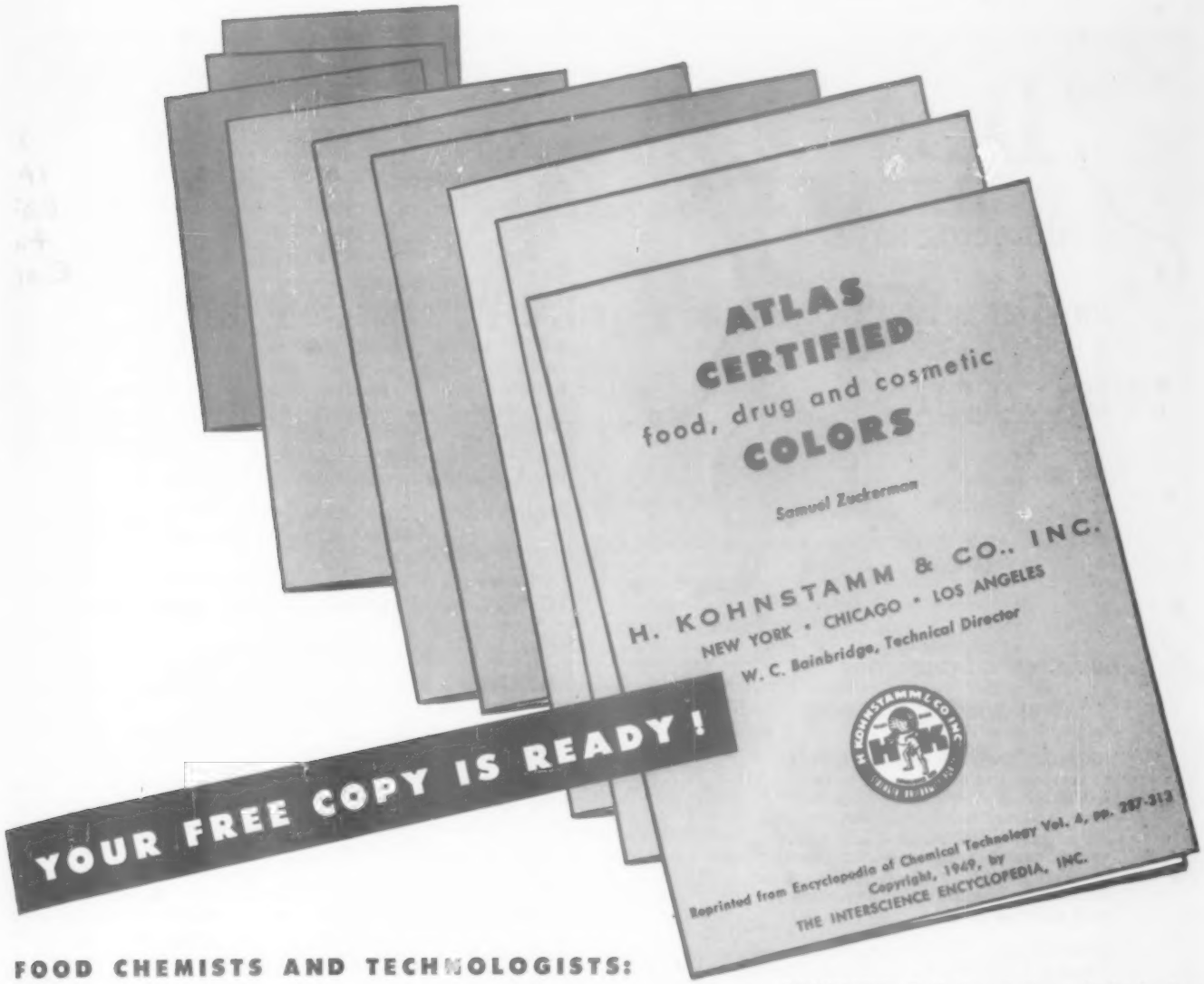
Several characteristics have been used in an attempt to describe *autocatalytic rancidity;* however, the hydro-peroxidic rancidity perhaps is the best. In decomposition of the hydroperoxide, active oxygen is produced which is associated with the auto-catalytic characteristic. It has been referred to as "ethylenic" rancidity due to the active oxygen attacking the ethylenic bond at the time the peroxide decomposes with the development of scission compounds which are directly responsible for the rancid odor and flavor. The predominance of aldehydes is characteristic of this type of rancidity and has given rise to its reference as "aldehydic" rancidity.

The term "reversion" is a misnomer because the objectionable flavor and odor is not characteristically normal to the *fresh* fat. The evidence is growing that the phenomenon is one of extremely limited oxidation involving linolenic acid. It seems that minute quantities of oxygen of molecular or intramolecular origin, under certain conditions of light, heat, and metal catalysts, can easily oxidize a component, such as linolenic acid, so as to give scission products associated with the decomposition of peroxides without accumulation of appreciable peroxides. There is suggestive evidence that auto-catalytic oxidation and reversion are similar and differ in degree.

Oil chemists find the *free fatty acid* a useful test but realize it is only associated with oxidative rancidity which has passed to an advanced stage resulting from chain scission. It is valuable as a simple test to reflect past treatment of fat-bearing tissue such as beef or pork tissue or oil seeds. It should be pointed out that tests for aldehydes represent transitory compounds of a late stage which, for the greater part, are oxidized to acids, reduced to alcohols, or polymerized. Tests are available for measuring the short (Issolio), intermediate (Lea), and long chain aldehydes (Schibsted).

Peroxide value. The formation of hydroperoxide has been shown to be common to air oxidation when promoted by metals, heat below 120° C., light or lipoxidase. Being the first step, it is not responsible for the rancid flavor but is a precursor. It has been extremely valuable in the development of the art of stabilization, being fully informative when applied to fresh fats and best when presented in a series following an accelerated oxidation test. *Active Oxygen Method* (AOM) or Swift test. This test is restricted to fats and oils which are practically free of non-fatty materials. By plotting the peroxide value against time of the test in hours, a curve is secured demonstrating the induction period and the auto-catalytic effect. The AOM value means, under the conditions of the test, that the keeping quality is so many hours. *The incubation test at 140° F.,* or Schaal test, is not well standardized. Its advantage is simplicity and the fact that fatty material can be tested, such as crackers, potato chips, cookies, prepared mixes, effects of papers and cardboards on fat, etc. It can be used in conjunction with the peroxide value, as is also the AOM.

The following factors affecting rancidity are discussed in turn: oxygen; composition and fatty acid configuration; temperature; light; chemical pro-oxidants—metals, and rancid fat; antioxidants; synergists; and moisture. Eighteen general references are provided.—*Commercial Fisheries Abstracts,* April, 1950.



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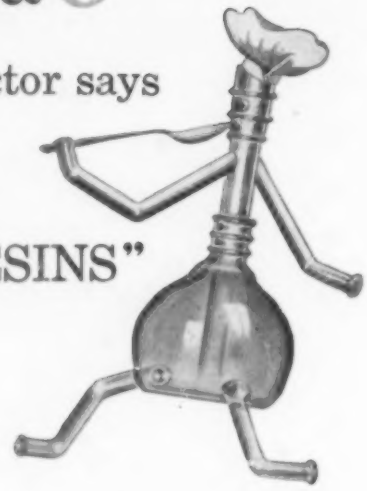

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Selected Abstracts

BIOLOGICAL SCIENCES

BIOCHEMISTRY

251J. Biochemical and nutritional significance of the reaction between proteins and reducing sugars.

LEA, C. H., AND HANNAN, R. S. *Nature, 165,* 438-9 (1950).

The browning reaction occurs when proteins and reducing sugars are heated together. Sodium caseinate and glucose held at 37° C. at 70% R. H., and free amino groups of protein reacted with glucose in ratio of 1-1. After 30 days, 90% of lysine, 40% of arginine, and 30% of the histidine were shown to have reacted. Approximately 50% of the methionine and 33% of tyrosine also disappeared. On further storage large amounts of dialyzable materials appeared. After 164 days, approximately one-third of the glucose undergoing change had been converted into dialyzable decomposition products.

252J. Effects of uronic acids, pectins and pectinates on enteric flora, alone and in combination with antibiotica. I. In vitro studies.

WOOLDRIGE, W. E., AND MAST, G. W. *Am. J. Surg., 78,* 881 (1949); *J. Am. Med. Assn., 142,* 1317, Apr. 22, 1950.

MICROBIOLOGY

253J. Delayed hydrolysis of butterfat by certain lactobacilli and micrococci isolated from cheese.

PETERSON, M. H., AND JOHNSON, J. J. *J. Bact., 58,* 701-08 (1949).

Several cultures of *Lactobacillus and Micrococcus* isolated from normal Cheddar cheese were found to possess intracellular lipases active between pH 5 and pH 6 and capable of considerable butterfat hydrolysis. The *Lactobacillus* isolates were identified as *L. casei,* and of the *Micrococcus* isolates there was 1 culture of *M. conglomeratus,* 1 culture of *M. freudenreichii* and 2 cultures of *M. caseolyticus.* None of these isolates were found to have intracellular lipolytic activity during their normal life cycle, but it seemed to occur after autolysis had taken place.

254J. The action of cationic detergents on bacteria and bacterial enzymes.

KNOX, W. E., AUERBACH, V. H., ZARUDNAYA, K., AND SPIRTES, M. *J. Bact., 58,* 443-52 (1949).

Several cationic detergents have been shown to produce effects of killing and inhibition proportional to the detergent-bacterial ratio, and not to the detergent concentration. Specific inhibition of detergent-sensitive enzymes was also described which might account for the metabolic inhibition, cell death, and increased permeability observed in bacteria with bactericidal amounts of cationic detergents.

NUTRITION

255J. Some interrelationships of copper, molybdenum, zinc and lead in the nutrition of the rat.

GRAY, L. F., AND ELLIS, G. H. *J. Nutr., 40,* 441-52 (1950).

The demonstration of various relationships such as those between copper and zinc, and molybdenum and zinc, and probably molybdenum and copper, emphasize the necessity for a consideration of the levels of all minerals in the diet before determining the requirements for any one. This type of study reaffirms the observation that a deficiency disease may not reflect merely a low level of dietary essential, but an excess of one or more other nutrients which interfere with the normal metabolism of that essential dietary constituent.

256J. Effect of sulphite in dehydrated foods on thiamine content of a diet.

THOMAS, M. H., AND BERRYMAN, G. H. *J. Am. Diet. Assn., 25,* 941-2 (1949).

(Continued on page 4)

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	Pectinesterase	Experimental	Demethoxylates pectin without hydrolysis of the galacturonic acid chain. pH range 3.5 - 5.
Proteolytic	RHOZYME P-11 Protease 15 Protease 16	Commercial Experimental Experimental	Hydrolyze proteins to peptides and amino acids. pH ranges 5.5 - 8.5. (Relative amounts of peptides and amino acids will differ for each proteolytic enzyme.)
Amylolytic	RHOZYME S RHOZYME T-22	Commercial Commercial	Hydrolysis of starch to dextrins, maltose and glucose. Contain both an alpha amylase and a strong glucogenic principle. pH range 5 - 6. RHOZYME S is a purified enzyme; RHOZYME T-22 the crude product.
	RHOZYME DX	Commercial	Hydrolysis of starch to dextrins. Heat stable. pH range 5.5 - 6.5.
Lactase	Lactase A	Experimental	Hydrolysis of lactose to glucose and galactose. pH range 6.1 - 7.5.

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Abstracts

(Continued from page 2)

It is unlikely that the level of sulphite encountered in the usual ration or diet would be enough to cause nutritionally significant destruction of the total thiamine content of a meal.

FOOD PRODUCTS

BAKERY PRODUCTS

257J. Preparation of wheat flour pentosans for use in reconstituted doughs.

PENCE, J. W., ELDER, A. H., AND MECHAM, D. K. *Cereal Chem., 27,* 60-6 (1950).

The separation of wheat-flour pentosans of low nitrogen content for baking tests was accomplished either by selective adsorption of the proteins of a heated, centrifuged flour extract on a suitable agent, or by precipitation of the proteins with the barium hydroxide-zinc sulfate reagent of Somogyi; dialysis then removed most of the remaining nitrogenous and carbohydrate impurities. The extracts were heated to destroy pentosanase activity. Yields were about 8 and 5 g. of pentosans per kg. of flour with the adsorption and the precipitation method, respectively. The precipitation method gave a product of higher purity and of lower average molecule weight, although pentosans obtained with either method showed the chemical characteristics noted by earlier workers, particularly gel formation upon oxidation. Under the conditions of this study, soluble pentosans had little effect on the baking performance of doughs reconstituted without the water-soluble fraction of flour, but the handling properties of the doughs themselves were distinctly modified. The pentosans corrected to a large degree the slack softness, wet surface, and lack of normal stickiness shown by doughs reconstituted with only gluten and starch. Improvements in volume, grain and texture were small.

258J. The effect of various ingredients on the rate of firming of bread crumb in the presence of polyoxyethylene (mono) stearate and glyceryl monostearate.

EDELMANN, E. C., CATHCART, W. H., AND BERQUIST, C. B. *Cereal Chem. 27,* 1-14 (1950).

Effective methods of retarding the progress of crumb firming during staling of bread include the use of lard as an ingredient, use of maximum water absorption coupled with minimum baking period required to produce bread with moisture content of not more than 38%, obtaining the maximum practical value for the ratio of baking pan volume to dough weight, and use of either polyoxyethylene (mono) stearate or glyceryl monostearate as an ingredient. Non-fat dry milk solids, sucrose, yeast, and sodium chloride were found to have little effect in delaying the increase in crumb firmness. The effect of various ingredients and of pan volume to dough weight relationship on increase in crumb firmness was investigated with and without polyoxyethylene (mono) stearate and with and without glyceryl monostearate.

COFFEE

259J. Why people buy a certain brand of coffee.

FREIBERG, A. D. *Coffee, Tea Ind., 73,* 10-11, April, 1950.

Of all the factors influencing people to adopt a particular brand of coffee, the price is probably the least important. The one most important factor is its quality or the advertising means by which the quality story is told. In spite of radical price increases, the relative importance of quality is greater today than ever. The expansion of caffeine-less coffees and also of instant coffees seems limited.

260J. The refrigerated storage of green and roasted coffee.

BAKER, C. E. *Ice and Refrig., 118,* 29-34, Jan., 1950.

Results of experiments on cool and refrigerated storage of coffee show improved flavor and appearance over dry storage. The process is considered economically practical, especially for premium grade coffees.

(Continued on back of insert)

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Authors of papers intended for publication in FOOD TECHNOLOGY should request from the Editor's office a copy of a booklet, titled "Suggestions to Authors," and see that their papers are in the form specified therein before they are sent to the editor.

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News of the Institute

PAUL FRANCIS SHARP

President, Institute Food Technologists, 1950-1951

Born in Allen, Nebraska in 1894, Paul Francis Sharp attended grade and high schools in that state, part of of the time living on a farm or in little country towns and knowing full well the burning heat in the summer and bitter chill and snows of the Nebraska climate.

World War I found Paul in the Chemical Warfare Service, assigned to the American University in Washington, D. C. The war over, he started graduate work at the University of Minnesota in the Department of Agricultural Biochemistry, obtaining his M.S. in 1920 and two years later his Ph.D. in the field of cereal chemistry under the late Professor R. A. Gortner.

After receiving his doctorate, Dr. Sharp went to the Montana Agricultural Experiment Station at Bozeman, first as assistant chemist and later as associate chemist carrying on research in the field of wheat and baking technology.

In 1925 he received the appointment of Professor of Dairy Chemistry at Cornell, a position he held for seventeen years. While at Cornell, Dr. Sharp majored in research in dairy chemistry, along with important investigations on eggs and potatoes. His contributions to dairy technology included studies on milk, sugar, lypolytic activity, ascorbic acid content of milk, milk flavors, and cheese making. His outstanding research was recognized by the American Dairy Science Association which granted him the Borden Award in 1941.

In 1942, Dr. Sharp left Cornell to become Director of Research of the Golden State Company at San Francisco, California. Here he directed research on various phases of milk processing. Particularly important were his contributions to the production of dry milk.

Dr. Sharp was appointed Director of the California Agricultural Experiment Station in 1949, a position he still holds.

On August 31, 1917, Dr. Sharp married Bernice Faustine Pyle; they have three children: Marylin Bernice, Joanna Juanita and Paul Francis.

Dr. Sharp is a member of the American Chemical Society; A. A. A. S.; Society for Experimental Biology and Medicine, and the American Dairy Association. He is an associate editor of *Dairy Science*. Active in Phi Lambda Upsilon, Gamma Alpha, Sigma Xi, Gamma Sigma Delta and Phi Kappa Phi, he has found time to be Chairman of the Program Committee of the Annual 1943 Meeting of the IFT at St. Louis; to be a National Councilor of the Northern California Section of IFT and Chairman of the Research and Marketing Act Dairy Advisory Committee of the U. S. Department of Agriculture.

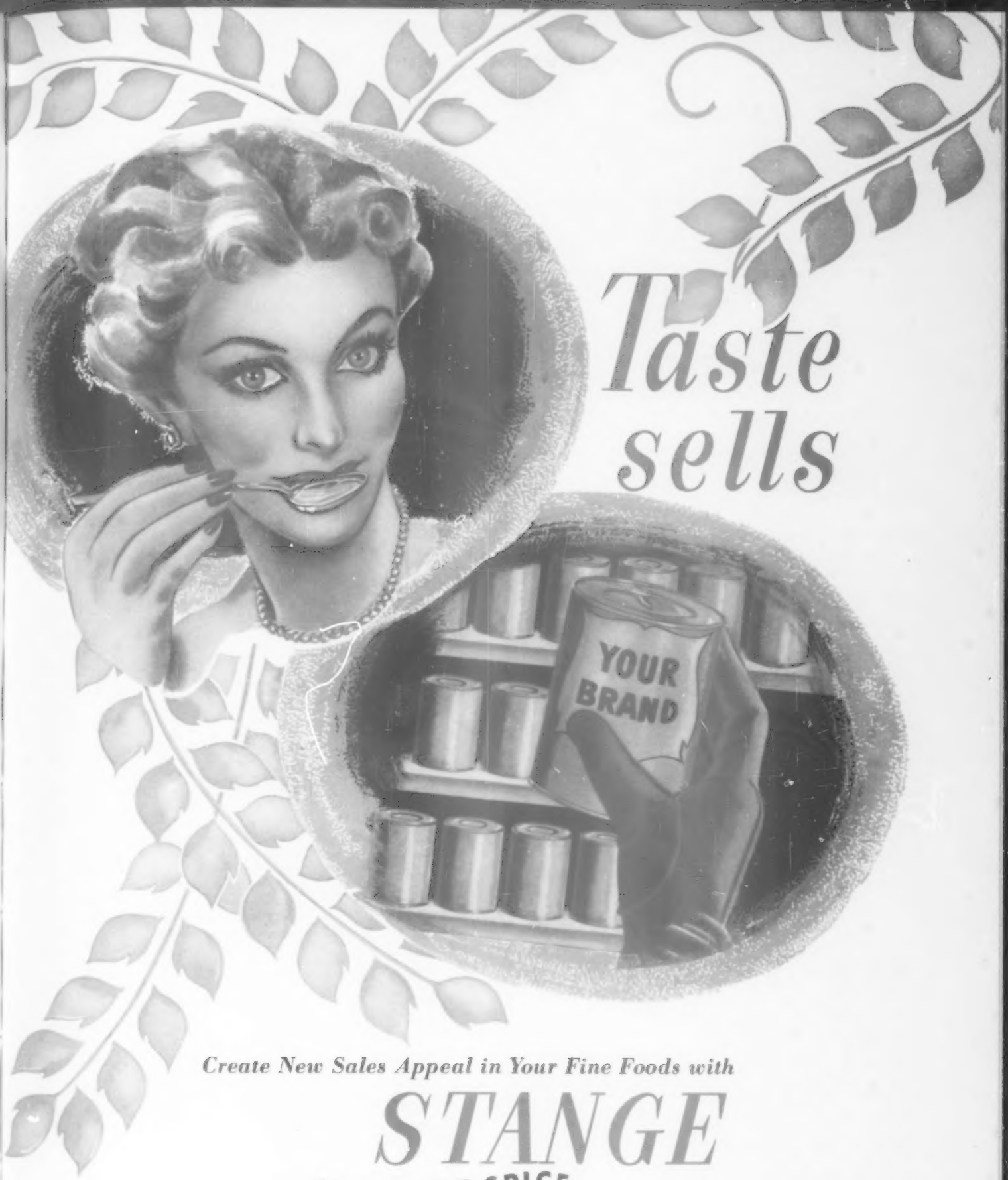
Dr. Sharp is the author of *Physik der Milchwirtschaft* (Berlin, 1928), and numerous papers published in technical journals.

PRESENTATION OF THE 1950 NICHOLAS APPERT MEDAL AWARD

Thomas M. Rector
1894-1950

The Nicholas Appert Award Jury of the Chicago Section selected Thomas M. Rector, Vice President of the General Foods Corporation, to be the 1950 recipient of the Nicholas Appert Medal. Shortly after this announcement was made, to the shock and sorrow of food

(Continued on page 10 following technical papers)



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Abstracts

(Continued from page 4)

EGGS

261J. Evaluation of future perishability of intact fresh eggs by radio frequency conductivity.

ROMANOFF, A. L. *Food Res., 14,* 310-13 (1949).

New laid eggs differ greatly in radio frequency conductivity, with eggs laid by the same hen having fairly similar conductivity. It is possible that these conductivity differences are related to differences in internal quality. Conductivity increases as time passes at a rate directly related to the original conductivity of the egg.

FATS AND OILS

262J. The alkali refining of oils containing vitamin A.

HARTMAN, L. *J. Soc. Chem. Ind., 69,* 55-8 (1950).

Under usual refining conditions, neutralization with alkalies increases rather than decreases vitamin A potency. The increase is approximately proportional to the free fatty acid content of the original oil. Refining losses of vitamin A were determined.

263J. Feeding tests with gallic acid ester antioxidants.

NILSON, H. W., BENDER, M., AND DARLING, D. B. *Comm. Fish. Rev., 12,* 20-21, Feb., 1950.

No chronic toxicity of the gallic acid derivatives was indicated when fed at a level of 0.5% gallic acid equivalent the cottonseed oil. This is equivalent to 0.05% in the total diet.

264J. Metal deactivation in lard.

MORRIS, S. G., MYERS, J. S., JR., KIPS, M. L., AND RIEMENSCHNEIDER, R. W. *J. Am. Oil Chem. Soc., 27,* 105-07 (1950).

A number of compounds, including known synergists, amino acids, and amines, have been evaluated as deactivators for copper, iron, nickel, and tin in lard. Some were effective in deactivating copper, but were relatively poor for iron. One compound was better for iron than for copper. Ascorbyl palmitate, potassium ascorbyl palmitate, and ascorbic, tartaric, citric, and phosphoric acids were the most effective. This deactivation may in part explain the synergistic effect of these compounds with phenolic antioxidants. The more powerful antioxidants however are generally poor metal deactivators, and in the presence of traces of metallic pro-oxidants become relatively ineffective unless metal deactivators are also added.

FISH AND SEAFOOD

265J. Floating cannery for whale meat.

Industrias Pesqueras No. 536, 6-15, Aug., 1949; *World Fish Abst., 1,* 5, Jan.-Feb., 1950.

Whale meat has been extensively used as food in Norway. During recent years the frozen meat has also been used in England. An English company, United Whalers Ltd., has installed a cannery for whale meat in one of its boats. The factory is mounted on three decks. The handling, preparation, and canning take place on the upper deck, the sealing operations on the second deck, and the processing and storage on the lower deck. The canning is completed a few hours after the whale is killed. The killed whale is hoisted aboard the mother ship, where it is cut up and the oil extracted. The pieces of meat best suited for canning are selected and transported to the floating cannery. The fresh meat is cut by hand into pieces which will fit the mechanical cutters. These contain three sets of circular blades. The first slices the meat, the second cuts the slices into strips, and the third cuts the strips into cubes. The meat is taken in containers of stainless steel to the filling machines, which add juice or sauce. After being sealed, the cans are transported to the processing compartment, where they are sterilized in a battery of six horizontal retorts. The cans are cylindrical in shape and are enameled inside. An air conditioning installation in the hull prevents rusting of the cans.

266J. Brown discoloration of canned crawfish.

DREOSTI, G. M., AND VAN DER MERWE, R. P. *(Jasus lalandii). Progress Report No. 7,* Oct., 1949; *World Fish Abst., 1,* 5, Jan.-Feb., 1950.

Considerable variations were found to occur in the color of canned crawfish, ranging from snow-white to brown. Browning during canning was found to be unrelated to such factors as the freshness of the fish, red pigment (astacin) of the epidermis, natural pH, etc., but directly related to the amount of reducing substances in the natural flesh and to severity of retorting. Too long a first cook—e.g., 15 minutes at 115.6° C. (240° F.)—or too short a first cook—e.g., less than 5 minutes at 115.6° C. (240° F.)—resulted in severe browning. Storage of the canned products between 0° C. (32° F.) and about 21° C. (70° F.) did not appreciably increase discoloration, but in the vicinity of 3.67° C. (98° F.) caused severe browning. Browning may be minimized by soaking the fish in running (fresh or sea) water for about 15 minutes after the first cook. Too long a soak, however, results in appreciable losses of flavoring substances from the flesh.

267J. Fish solubles and liquid fish for growing and fattening swine.

GEURIN, H. B., HOEFER, J. A., AND BEESON, W. M. *J. Animal Sci., 9,* 94-9, Feb., 1950.

Fish solubles and liquid fish have been compared for their supplemental value to an all-plant basal ration of corn, soybean oil meal, sun-cured alfalfa meal, and minerals for growing and fattening swine in dry lot. The results obtained indicate that condensed fish solubles and liquid or semi-solid fish contain dietary factors other than protein, which greatly improve the nutritive value of a corn-soybean meal ration for growing-fattening pigs.

268J. Shrimp peeling machine.

Southern Fisherman, 9, No. 11, 33, Sept. 19, 1949; *Comm. Fish Abst. 3,* 23-4, Jan., 1950.

Washed, whole shrimp are delivered to the peeling machine from a hopper tank where they are spread onto an inclined belt in a uniformly even layer. The apparatus which does the actual peeling uses nine 3-inch diameter, rubber covered rollers located side by side and running the full length of the machine which is pitched downward at an angle of approximately 15 degrees. There is practically no breakage of shrimp, and there is an increase of from 5 to 10% in the recovery of meat from the head and tail sections that is impossible to obtain with hand peeling. The machine is said to be capable of replacing from 15 to 60 hand pickers, depending upon the conditions of operation.

PECTIN

269J. Studies on lemon pectin. II. Behavior of pectic substances during ripening.

CULTRERA, R., AND DE LUCA, G. *Ann. Chem. Appl. 37(2),* 75-80 (1947); *Biol. Abst. 24,* 319, No. 3600 (1950).

Lemons were analyzed during ripening from February to May for their protopectin content. This insoluble pectin-cellulose complex is isolated and hydrolyzed by cold mineral acid in 60% ethanol for 80 hours. The liberated, but alcohol-insoluble pectin is weighed and analyzed for acidity, methoxyl, ash, Ca pectate and jellability. Until the last weeks of maturity, the protopectin content remains 12% of the fruit, as it has to defend the cellular integrity; but it drops to 8% upon complete maturation. Its properties are constant during the entire period. Protopectin is a depot substance, while increasing quantities of free pectin are formed steadily from the assimilate via galacturonic acid.

(Continued on page 11 following technical papers)

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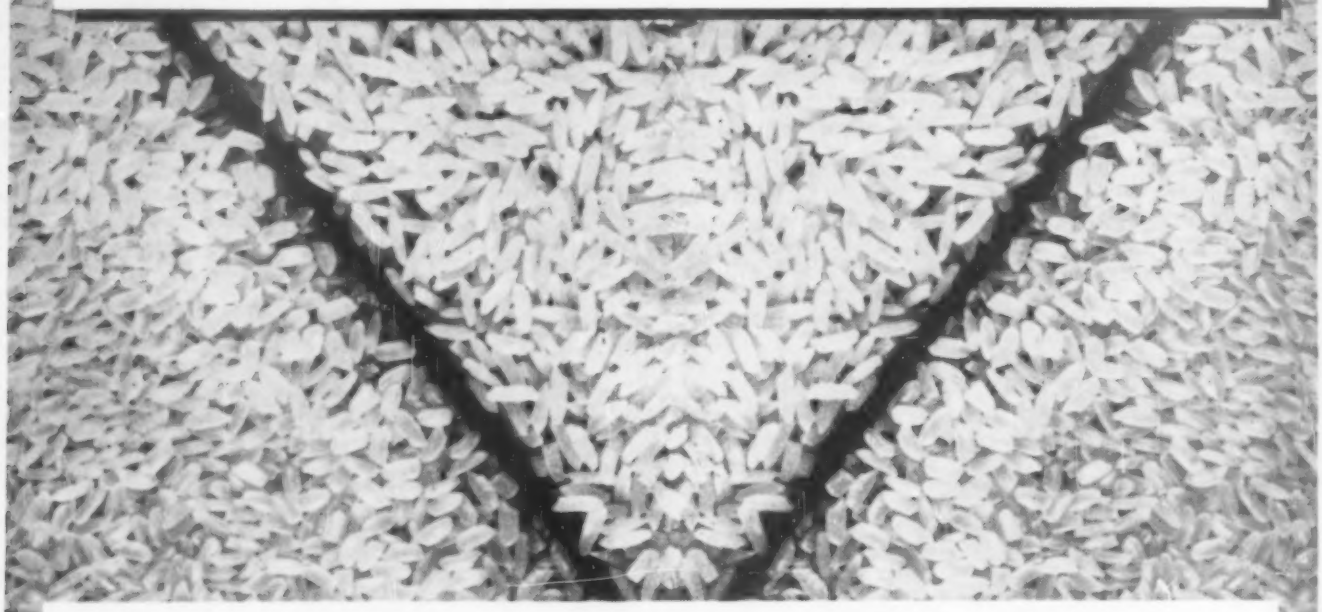

NOW...MILLED WHITE RICE CAN MEET MODERN NUTRITIONAL DEMANDS

Nutritionists, Government authorities and cereal processors the world over will, we believe, welcome this Hoffmann-La Roche news. For until peoples of the great rice-eating nations can enjoy a state of health free from beriberi and other effects of malnutrition, world trade and international security will be deprived of a most essential guarantee. A nation cannot be BOTH productive and happy without good health. Now it can be both even if its people's principal staple food is milled white rice.

Enrichment of wheat flour, macaroni products and corn meals was a relatively simple problem which Roche chemists and technical experts helped to solve. However, the popular practice of washing or rinsing rice before cooking renders the usual type of enriching premix useless since the vitamin content dissolves in the water and is lost. As a leader in world production of vitamins, Hoffmann-La Roche looked for a means of hurdling this difficulty, found it, and its patented processes have been made available to the rice milling industry.

Going further, and to demonstrate conclusively that addition of lacking vitamins and minerals to a staple food cereal was a practicable and easy means of correcting dietary deficiencies, Hoffmann-La Roche joined with four other participants in making possible the greatest nutritional experiment* of all time. Involving 100,000 Philippine people, this experiment has furnished proof with which flour millers, bakers and other cereal processors can overcome the "doubting Thomases" of "enrichment."

Ask to see, and if you eat rice insist upon being served, the new "nutritionally improved" milled white rice carrying thiamine, niacin and iron at the same minimum per pound levels as enriched white wheat flour and corn products.

*The experiment is under the joint auspices of the Williams-Waterman Fund, Republic of the Philippines Department of Health, United States Public Health Service Rehabilitation Program, National Rice and Corn Corporation of the Philippines and Hoffmann-La Roche Inc. Preliminary reports published thus far have appeared in the Journal of Nutrition of August 1949, Journal of the Philippine Medical Association, November 1949, and the Rice Journal of April, 1950.

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NEW SAFETY CODE FOR REFRIGERATION APPROVED AND PUBLISHED

The revised Safety Code for Mechanical Refrigeration, commonly known in the refrigeration industry as the American Standard B9 Code, has been thoroughly revised, superseding the old 1939 edition of B9, and is now available for sale by the American Society of Refrigerating Engineers, 40 West 40th Street, New York City, for $1.00 per copy. The ASRE is sponsor of the Code which has been adopted as an industry standard by the American Standards Association.

The revised B9 Code is the result of several years' effort by an ASA Sectional Committee composed of 77 members and several subcommittees with more than 25 members. These members represent every phase of the refrigeration industry as well as casualty and insurance groups, the Bureau of Explosives, the valve and fittings industry, the National Fire Protection Association, the Underwriters' Laboratories, and many others.

The new Code is considerably more comprehensive than its predecessor. Additions have been made to clarify controversial sections in the old Code and to cover new equipment and installation procedures which have been adopted since the war. In general, all of the requirements are much more specific, more to the point, and more readily understood. Certain of the requirements dealing with piping, copper tubing, and fittings have been brought up to date and clarified.

The sponsors of the Code are emphatic in their recommendation that municipalities and states adopt the new Code in its entirety. The sponsors point out that, "a great deal of the value of the Code is lost if only sections of it are followed and practiced; the Code is built, one regulation upon another, and to use it piecemeal is to destroy the effectiveness of the document."

The foreword of the Code states, "It is desirable that this Code be universally adopted so that safety provisions for refrigerating installations will be standardized, thereby permitting quantity production of refrigeration equipment with minimum cost to the user."

An Interpretations Committee has

(Continued on page 15)

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In chicken soups add MSG at 0.2% on a ready-to-serve basis. For vegetable soups and chowders, use MSG at 0.15%, while for mushroom soup and creamed vegetable soups use MSG at 0.2%. Soups with strong beef stock taste are more effectively improved with Huron HVP, prepared in liquid, paste and powder form for convenient application. In canned soups of this type the HVP liquid should be added at 1.0% up to 2.0%. Soups of less pronounced meat stock flavor should contain 0.5% to 1.0% HVP alone, or in combination with the amounts of MSG recommended above. For dry soups the HVP powders are used, at corresponding levels, adjusted for flavor solids content.

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News of the Institute

(Continued from page 6)

technologists throughout the nation, Mr. Rector died on April 1st at Battle Creek, Michigan.

At the Tenth Annual Convention of the Institute of Food Technologists at Chicago, Illinois, Mrs. Rector accepted the Award on behalf of her late husband. The presentation took place at the Nicholas Appert Medal Banquet on May 23, 1950. Below we record the proceedings of the presentation.

Thomas M. Rector Memorial Address

by Clarence Francis
Chairman of the Board, General Foods Corporation

We are talking today about a truly great American of real pioneer stock. Tom was born near Warrenton, Virginia in 1894. His forebears emigrated to that immediate territory in 1713 and at that point they established the first iron mine and foundry in Virginia.

Tom was a relative of the Governor of Arkansas. His cousin was Secretary of State. His grandfather headed the first United States Marine Band, and as a matter of fact, talked to John Philip Sousa.

He attended country school at Georgetown and Western High School in Washington, D. C. He never did attend college as such, but at high school he became interested in chemistry and at the age of 18, at which age most of us were floundering around, he decided on technical work for improving food products as a career. At that time, no courses were available. His education came from observation and the study of anything he could lay his hands on.

He worked in a chemical consulting laboratory in Washington, D. C. He was a chemist for the Pompeian Olive Oil Company. While there he aided in developing three new products and at a very early age developed a new continuous emulsifying process.

Later, he went to war, World War I, enlisting as a private in the Chemical Warfare Service and afterwards became a first lieutenant. During that period also his inventive genius was active for he developed a process for producing gas mask charcoal.

While working for the Institute for Industrial Research Tom founded the Division of Food Technology in 1920. This was the first time the term "Food Technology" had been formally used.

He then became Director of Chemistry in the largest consulting firm in New York City. Later, he became Research Director of the Franklin Baker Company and while there he proved that inert gas packing was useful in many ways. He went to India and while there developed ways of collecting, treating and shipping cashew nuts and as a result of his operations, became the largest importer and seller of cashew nuts.

At one time the teacher asked his daughter what her father's business was and she replied, "My father is King of the Nuts."

He went to work for the Hellmann Company and there developed a new method for producing salted egg yolk. In 1927 General Foods purchased the Hellmann business. We bought a business and we got Tom Rector. We sold the business, but we kept Rector.

Tom became General Manager of our Central Laboratories where several hundred people are employed and where a few million dollars are expended in research each year.

He later became Vice President in charge of all Research and then was made a member of our Executive Council, which is the management group of the business.

He developed at least 15 successful new products. Just how many new processes he was responsible for nobody knows, but there were plenty of them. A typical example of his operations would be the decaffeinization of coffee. When that process was acquired, the operation took 88 hours. When Tom got through with it, it was down to 8 hours and had he lived, even more time might have been saved.

Let me read a list of some of the patents which we know have been issued to Tom:

Producing Transparent Emulsion, 1921
Recovery of Volatile Solvents, 1922
Packaging Tobacco and the Like, 1925
Battery, 1925
Mushroom Paste, 1927
Canning Process, 1927
Preserved Food Product and Process, 1928
Preserving Products Formed of Rubber, 1928
Coffee Preparation, 1929
Apparatus for Packing Cashew Nuts, 1929
Preserving Eggs, 1930
Extracting Nut Oil, 1930
Packing Nuts, 1931
Method and Apparatus for Extracting Oil from Nuts, 1932
Forming Transparent Containers, 1934
Apparatus for Preparing Food Products, 1935
Preparing Food Products, 1935
Extracting Oil from Cashew Nuts, 1935
Apparatus for Vacuumizing, 1937
Treatment of Nuts, 1940
Coconut Product and Process for Making Same, 1942
Process and Apparatus for Decaffeinating Coffee, 1943
Method and Apparatus for Solvent Extraction, 1945
Helix of Metal Wire for Use as Fishing Sinkers and for Other Purposes, 1950
Therapeutic Pectous Product, 1943

He had many other activities. He was an author. His book, "Scientific Preservation of Food," is widely used.

He was a member of leading scientific societies.

He was a speaker in great demand.

He was a consultant for the Government and a member of many important Governmental committees.

Tom's story is truly a typically American story. He was a man of modest means. He worked hard for all he got. He set his own course and became a success. This Way of Life, which so definitely typifies Rector, is one which is bandied about in some quarters too lightly and without appreciation.

You men who are so individualistic, who are so thoughtful, who are so ingenious, who inspire new methods and better products, should fully appreciate the value of this Way of Life and do all that you can in your respective communities to preserve it.

Yes, Tom had great technical skill, but those of us

(Continued on page 13)

Abstracts

(Continued from back of insert)

270J. Pectin studies. IV. Consideration of gel strength and viscosity.

LAMPITT, L. H., MONEY, R. W., AND JUDGE, B. E. *J. Soc. Chem. Ind., 69,* 53-5 (1950).

Gel strength and viscosity studies have been carried out employing a series of pectins obtained by degrading citrus pectin by grinding for various times in a ball mill. As degradation increased, the quantity of material estimated as calcium pectate, but not contributing to gel formation, increased and the slope of the straight line representing the gel strength and square of the concentration relationship became less. It is shown that this slope bears a linear relationship to the limiting viscosity values for the pectin in aqueous solution and the nitro-ester in acetone solution and that it is proportional to the Young's modulus of the fibrils constituting the gel.

SUGARS AND SIRUPS

271J. A new sweetening agent.

LEHMSTEDT, K. *Seifen-Ole-Fette-Wachse 75,* 81-2 (1949); *Chem. Abst. 44,* 1207i (1950).

The new sweetening agent 2-propoxy-5-nitroaniline (cf. C. A. 41, 4170e; 42, 5899ad) may not be physiologically innocuous for human consumption, but its sweetening power is so high (4,000 times that of sugar) that only minute concentrations are required. Since small quantities of vitamin C (250-1200 mg. percent as present in rose-hips) are sufficient to reduce the NO_2 group and destroy the sweetening power, the compound should be added to foods only after cooling.

272J. New uses sought for maple products.

Rep. Bur. Agr. Ind. Chem. (1949); *J. Am. Diet. Assoc., 26,* 176, Mar., 1950.

An experimental maple sirup that is almost entirely free of both maple flavor and the associated color was made by low-temperature vacuum evaporation of sugar-maple sap. The production of such a sirup, together with other substantiating evidence, strongly indicates that the flavor and color of maple sirup are not pre-existent in the sap, but are developed by conventional processing after the sap leaves the tree.

PACKAGING

273J. Rat repellent.

HAMPEL, C. A. *Pest Control, 17,* 40 (1949); *Pack. Abst. 7,* 12, No. 36, Jan., 1950.

It is suggested that sodium fluosilicate, properly coated on the outer surface of paperboard shipping cartons, would do much to stop the loss caused by rats. The compound might be applied in the glue liner of the paperboard or incorporated in the paperboard itself at the time of manufacture. Sodium fluosilicate has the advantage of being an irritant and repellent to warm-blooded animals even in small quantities. Studies to evaluate its possibilities are in progress.

274J. Danish research on the use of aluminum for canned foods.

BRAMSNAES, M. *Rev. fermentations et inds. aliment., 3,* 196-202 (1948); *Chem. Abst. 44,* 1619[b] (1950).

Ordinary Al can be used for cannery products in the pH range 6.2-7.2; with anodized (oxidized) Al the pH may extend down to 5.5. An alloy with 1.25% of Mn is necessary with smoked herring and kipper snacks. Most fish in oil can be canned in plain Al but tuna in oil and certain sardines require anodized Al. Certain unsterilized salted products can be canned in plain Al, others not. Lacquered cans must be used with vegetables, especially those containing oxalic acid (spinach, kale) which is strongly corrosive on Al; addition of a small amount of $CaCl_2$ relieves this condition. Meats canned in ordinary Al develop H swells in 6 months; anodized and lacquered cans are required for stews and smoked ham products. Plain

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Abstracts

Al is suitable for condensed milk (with sugar) but unsugared milk requires the anodized metal. Anodized and lacquered Al is required for fruits; otherwise H swells develop.

PATENTS

275J. Acid leaching of pectinous materials.

OWENS, H. S. *Assignor to the United States of America as represented by the Secretary of Agriculture.* 2,502,477. April 4, 1950.

The process which comprises leaching vegetable material, in which the pectin has been partially de-methoxylated in situ, with aqueous acid at a pH from about 0 to about 2.5.

276J. Coconut processing.

GLABE, E. F. *Assignor to Food Technology, Inc., Chicago, Ill.* 2,502,516. April 4, 1950.

The method of preparing sweetened coconut which comprises intimately mixing coconut fibers with a solid sweetening composition, evacuating air from the pores of said fibers, melting said sweetening composition by the addition of superatmospheric steam and forcing molten sweetening composition into said evacuated pores by steam pressure.

277J. Coconut product and method.

STRAUB, W. F. *Assignor to W. F. Straub & Company.* 2,505,746. April 25, 1950.

A coconut product comprising shredded coconut and liquid honey as a hygroscopic agent for coconut.

278J. Modification of starch.

KERR, R. W. *Assignor to Corn Products Refining Co.* 2,503,053. April 4, 1950.

The process of modifying starch which comprises contacting starch with aluminum chloride hexahydrate at starch temperatures between about 20° C. and about 105° C., said aluminum chloride hexahydrate ranging in amount from about 0.05% to about 0.5%, based upon the dry weight of the starch, said starch undergoing modification containing moisture ranging in amount from about 1-2% to about 20% of the total weight of starch and moisture, the pH value of said starch undergoing modification ranging from about 2.8 to about 3.4.

279J. Method of producing light-colored sirups.

CHRISTENSEN, L. M. *Assignor to National Agrol Company.* 2,503,241. April 11, 1950.

A method of producing syrups of high sweetening power and low color which comprises extracting a starchy substrate with a solvent for sterols and waxes until a substantial proportion of the sterols and waxes are removed, heating an aqueous slurry of the extracted starch to effect gelation thereof, cooking the starch at elevated temperatures, then cooling the cooked mash to optimum saccharification temperatures and inoculating the cooled mash with an amylase-containing saccharifying material.

280J. Preservation of fresh citrus fruits.

GERICKE, C. E. *Assignor to American Machinery Corporation.* 2,503,663. April 11, 1950.

A bath for the treatment of citrus fruit containing a fungicidal agent and a substituted ammonium salt having at least one hydrocarbon chain of 10 to 18 carbon atoms.

281J. Coloration of fresh citrus fruits.

GERICKE, C. E. *Assignor to American Machinery Corporation.* 2,503,664. April 11, 1950.

In a process of enhancing the varietal color of citrus fruit, the step of bringing the fruit into contact with a dye suspended in the solution of a salt of an amine, said amine having at least one hydrocarbon chain of at least 10 to 20 carbon atoms.

282J. Coloration of fresh citrus fruits.

GERICKE, C. E. *Assignor to American Machinery Corporation.* 2,503,665. April 11, 1950.

In a process of enhancing the varietal color of citrus fruit, the step of bringing the fruit into contact with a dye suspended in a solution of an amine at a temperature in the order of 104° F. to 124° F., said amine having at least one hydrocarbon chain of 10 to 20 carbon atoms.

283J. Toasted coconut chips and process of producing same.

O'LEARY, T. B. *Assignor to Evelyn Turner O'Leary.* 2,503,763. April 11, 1950.

The process of producing toasted coconut chips which comprises the steps of slicing raw coconut meat to produce wafer-like chips, pickling the chips in a brine solution, dehydrating the salted chips, and subjecting the dehydrated chips to heat by toasting.

284J. Purification of sugar solutions.

RAWLINGS, F. N. *Assignor to The Dorr Company, New York.* 2,503,767. April 11, 1950.

The method of treating impure sugar-bearing liquids in which the non-sugars include dissolved pectinous and albuminous compounds, which comprises establishing and maintaining a bed of acid-regenerated granular cation exchange material and a bed of alkali-regenerated granular anion exchange material, supplying such impure liquid to the cation bed to precipitate such non-sugars in such liquid incident to the low pH engendered therein by the cation exchange, and passing such liquid through the voids between the granules of the bed, removing liquid from the cation bed with its precipitated non-sugars in suspension therein, flocculating precipitates suspended in the liquid into separable form while detained outside of the cation exchange bed, separating such flocculated non-sugars from the liquid, and supplying the latter to the anion bed.

285J. Preparation of a stabilized cream product.

CHRYSLER, L. H., AND ALMY, E. F. *Assignors to M & R Dietetic Laboratories, Inc.* 2,503,866. April 11, 1950.

A process for producing a milk material comprising treating a fluid milk product having a substantially normal calcium and phosphorus content and a pH of about 6.5-6.8 with a cation exchange material operating in the sodium cycle, until the calcium content of the product is approximately 20 to 70% of normal and there is secured in the product a calcium to phosphorus ratio of about 0.15 to 0.75, thereby raising the pH of the product, and treating the resulting product with a cation exchange material operating the hydrogen cycle until the pH of the original milk product is substantially restored.

286J. Preparation of fondants, fudges, and the like.

LEBESON, H., AND FIELD, A. H. *Assignors to National Syrup Products Co.* 2,504,542. April 18, 1950.

A method of making fondant which comprises heating chip sugar at a temperature not in excess of 165° F. to produce a semi-liquid mass of smooth, creamy consistency, admixing therewith a separately prepared aqueous solution of at least one sugar product from the group consisting of sucrose, corn sugar and corn syrup, and cooling and creaming said mixture.

287J. Separation of starch from wheat flour.

BURDICH, E. M. *Assignor to the United States of America as represented by the Secretary of Agriculture.* 2,504,962. April 25, 1950.

The method of separating starch and gluten from whole wheat and wheat flours comprising forming a batter of the wheat material with sufficient water to hydrate the gluten completely, increasing the gluten to starch ratio of the batter by leaching it with about 3 to 5 parts water and separating the resulting starch milk by screening, aerating the gluten of the resulting mass and separating the aerated gluten from the remaining components by flotation.

News of the Institute

(Continued from page 10)

who were privileged to know him will remember him for other traits—those plus values.

He loved life. He loved people. He gave credit for accomplishment, but he was never satisfied.

He was restless. He was alert. He could tell a good story and he loved the great outdoors and how well I remember some of those outdoor parties with him.

He was a great fisherman and even there he did some inventing. His "Bottom Bumper" is known to many of us. He knew birds and he not only could call them, but he did call them and on one occasion he convinced everyone that he actually had live ducks in his office.

At one time Mrs. Rector tried to interest him in an apartment. She persuaded him to go to see a real estate agent. Tom entered the office and shortly came out smiling. Mrs. Rector inquired, "Is everything O. K.?" To which Tom replied, "Yes, I found the office empty." So, they compromised and bought another home where they would have room for his dogs.

No one ever asked Tom for help and advice who failed to get it.

Yes, gentlemen, Tom was a product of America—he contributed to America—he believed in America and at all times, and over and above his business assignment, he fulfilled his duties as a citizen and was a great credit to his chosen profession.

He believed in making things move—he abhorred the static.

He had initiative and decision. He believed in the ultimate supremacy of right.

He had confidence in men. He had faith in the future.

His was a dynamic life.

In closing, Tom came to me and told me in confidence in an embarrassed, almost schoolboy fashion, of the Award that was to be made to him by you. He was surprised — he was actually amazed at his selection. But I knew then, as I know now, that no experience in his active and successful business life had ever made him so happy.

In conclusion, Tom had great courage and he admired courage. How proud he must be of his life right now.

Presentation of the Nicholas Appert Medal Award by Colonel Rohland A. Isker

It would be an anti-climax to attempt to add to the eloquent tribute paid to Tom Rector by our distinguished speaker, Mr. Clarence Francis. It will not be inappropriate to dwell briefly on the larger meaning of the Appert Award and in so doing, I shall hope to convey to you how richly Tom Rector deserved the honor of its award.

The Jury of Award consists of nine members chosen from members of The Institute of Food Technologists. Each year the executive committee of the Chicago section elects three jurors to serve for a term of three years. Special attention is given to the variety of interests and geographical location in making the selections of the jurors. Each juror is a recognized authority in his own field. The Chairman of the Chicago section is

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News of the Institute

(Continued from page 13)

Chairman of the Jury without vote. Other than this the Chicago Section has nothing to do with the selection of the Medalist unless by chance a member of the Chicago Section is selected as juror. The identity of the jurors is kept confidential within the Executive Committee of the Chicago section. All nominations for medalist and all balloting is conducted by private correspondence between the individual juror and the Chairman of the jury.

The Nicholas Appert Medal Award rules state that "the award shall be made to anyone who, because of his preeminence in and contributions to the field of food technology, is deemed worthy of special recognition by the jury." The award has always been given to men who have been propelled by a consuming desire to discover the innermost laws of nature and to draw out for the use of mankind truths that can be applied to the betterment or extension of our food supply. They have in some cases, as did Nicholas Appert, accomplished momentous results alone. In other cases they have achieved their results by working with and inspiring others. But the source of the achievement in all cases has been integrity of purpose, a refusal to be content with apparent truth, or half truth, or temporary truth.

The Appert Medal, therefore, in its highest interpretation may be said to symbolize "integrity of achievement." Eminent scientists, no matter how widely they may differ in fields of interest, are alike in one thing: Their minds are fixed on their work and on their methods of work. Through that complete dedication to the task in hand they develop the habit of intellectual honesty that unites them. To say that science is a "search for truth" is not speaking idly. These words are the passwords to fame.

This medal, Mrs. Rector, pays tribute to the "integrity of achievement" of Tom Rector. He was a distinguished "searcher for truth" and his name will shine forever on our Roll of Appert Medalists. It is an honor and profound privilege to convey this medal into your safekeeping.

Acceptance by Mrs. Thomas M. Rector

Colonel Isker, Mr. Francis, Ladies and Gentlemen:

I accept the Nicholas Appert Medal Award in the name of my husband.

The knowledge that he was to receive the Award was very dear to him.

I will keep it and cherish it as long as I live.

Thank you.

Regional Section News

PERSONNEL

STANLEY A. BEATTY, Director, Atlantic Fisheries Experiment Station, Halifax, Nova Scotia, has been elected president of the Chemical Institute of Canada. Dr. Beatty's picture appears on the July 10, 1950 issue of *Chemical and Engineering News*.

DANIEL M. DENT, General Manager, The Borden Co., was elected president of the Associates, Food and Container Institute, succeeding Dr. B. S. Clark, director of research, American Can Co., who becomes Chairman of the Board.

BRADLEY DEWEY, President, Dewey and Almy Chemical Co., Cambridge, Mass., returned in June from a two-month trip through France, Switzerland, Holland, Belgium, England and Western Germany. He was the opening speaker on a symposium of "Science and Society," held in June at South Bend, Ind.

MAX S. DUNN, Professor of Biochemistry, University of California at Los Angeles, has been awarded the honorary degree of Doctor of Science by Simpson College, Indianola, Iowa.

FRANK C. ELLIOT, formerly associated with Henry W. Peabody and Co., Inc., Seattle, Washington, has been appointed to the Production Office of the National Security Resources Board. Mr. Elliot has been associated with the canning industry since 1912 when he was employed by the American Can Co.

MAYNARD JOSLYN of the University of California at Berkeley underwent a major operation at Herrick Memorial Hospital in June.

E. T. KEATING of Huron Milling Co. has been appointed Sales Manager of the Food Seasoning Division of that company, succeeding E. R. Jobson who has resigned to purchase a farm in Manchester, Vt. Lucky fellow.

JOHN N. NAIR, Assistant Director of Research, Continental Foods, Inc., was elected Chairman of the New York Section of the American Chemical Society, succeeding Dr. R. M. Burns, Chemical Director, Bell Telephone Laboratories. Mr. Nair took office July 1st.

ROBERT K. PEDERSON, formerly Technologist, Department of Fisheries, Seattle, Washington, is now with French Sardine Co., Los Angeles, where he heads the new quality control and development division of that company.

ELDON H. PFAHLER, formerly food technologist with Cherry Growers, Inc., Traverse City, Michigan, has purchased the Ottawa Canning Co., Coopersville, Michigan. The name of the company will be changed to Samary Food Products, and frozen foods as well as a regular line of canned foods will be packed.

HENRY J. REYNOLDS, for the past 25 years in the chemical research department of Armour and Co., Chicago, has resigned to become process manager for Piedmont Poultry Co., Gainesville, Georgia.

H. K. WILDER, Assistant Director of the National Canners Association's western branch laboratory in San Francisco, has resigned to become director of research for Schuckl and Co., at Sunnyvale, California.

NEW YORK SECTION

The local Arrangements Committee for the 1951 Annual Meeting (which probably by now everyone knows will be held in New York, June 17-21) has been busy during the summer with over-all policy and budget matters so that all activities will shift into high gear by early fall. Chairmen of the various sub-committees are:

(Continued on page 16)

I. F. T. EMPLOYMENT SERVICE

In the interest of bringing together organizations seeking the services of food technologists, and food technologists seeking new positions, the Council of the Institute has established the service outlined below.

A. Organizations in the food and allied industries may run notices of positions open in food technology and no charge will be made for this service. Notices will appear over code numbers and replies will be forwarded promptly to the firm running the notice. In no case will the identity of the firm be revealed. To take advantage of this service simply write to the Executive Secretary of the Institute of Food Technologists, 176 W. Adams St., Chicago 3, Illinois, describing briefly the position that is open. Notices received before the 10th of any month will appear in the next issue of FOOD TECHNOLOGY, published on the 5th of the following month. Notices received after the 10th will appear one month later. All that is asked is that the firm or organization running the notice acknowledge to the applicant each application received. Should the position not be filled by one insertion the same notice will be repeated upon request.

B. Members of the Institute seeking new positions may run notices in FOOD TECHNOLOGY at $2.00 per issue. This is about one-fifth the regular space rate. Remittance to cover the cost must accompany the notice. Simply mail your notice with $2.00 to the Executive Secretary.

Notices of positions open or positions wanted will be limited in size to one column inch—approximately 30 words.

Members are requested to bring this service to the attention of personnel directors of their organization.

NEW SAFETY CODE

(Continued from page 9)

been formed since the Code was issued last month to interpret and explain any provisions of the Code and to keep it abreast of the advancements in the art of refrigeration. (Am. Soc. of Refrig. Eng., News Item, July, 1950).

EMPLOYMENT NOTICES

Wanted, cereal chemist, preferably with biochem. training and section leader experience, to head a major development group. Midwest. $7500 if qualified. Reply BOX 108, Institute of Food Technologists, 176 W. Adams St., Chicago 3, Illinois.

Wanted — Leading established canner (East) desires well trained young man for diversified research program on variety of canned foods. Commercial experience desirable but not required if academic training good. Salary—open. Reply Box 104, Institute of Food Technologists, 176 W. Adams St., Chicago 3, Illinois.

Wanted, Food Technologist, chem. & engineering background, experience in milk, cereal or vegetable field, by large midwest food and pharmaceutical manufacturer. Phases of new product development offer real opportunity for right man. Give training, experience, references, salary and photograph. Reply BOX 105, Institute of Food Technologists, 176 W. Adams St., Chicago 3, Illinois.

Wanted, Food Technologists for control and development work. Knowledge of soda fountain operations, ice cream manufacture, dairy operations, canning and preserving desirable. Opportunity for independent operation. Give full details. Reply BOX 110, Institute of Food Technologists, 176 W. Adams St., Chicago 3, Ill.

Position wanted by Food Technologist, B.S. Cornell, 5 yrs. experience production, quality control, product development, and sanitation analysis. Desires quality control or production N. Y. area. Reply BOX 107, Institute of Food Technologists, 176 W. Adams St., Chicago 3, Ill.

Wanted, experienced baking chemist. BS in cereal chemistry or home economics. Interested in baking technology, experimental cookery, statistical evaluation. Southern location. Prefer unmarried woman over 30 years of age. Reply BOX 106, Institute of Food Technologists, 176 W. Adams St., Chicago 3, Illinois.

Wanted, College Graduate, Food Technology or Chemical Engineering background for production and control in fruit processing plant New York State. Give full details, salary, Reply BOX 109, Institute of Food Technologists, 176 W. Adams St., Chicago 3, Illinois

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Regional Section News

(Continued from page 14)

Finance—P. D. Kratz
Exhibits—R. C. Sherwood
Publicity and Printing—B. L. Oser; A. A. Schaal (Co-Chairman)
Hotel and Housing—I. D. Garard
Registration—H. G. Beattie
Banquet and Luncheon—R. T. Bohn
Smoker and Entertainment—A. J. Finberg
Meetings—Daniel Melnick
Guests—Ladies—Ruth R. Bien
Field Trips and Transportation—Lawrence Atkin.

Local Section Officers were elected at the May meeting:

Chairman—S. L. Galvin
Vice-Chairman—R. T. Bohn
Secretary—A. A. Schaal
Treasurer—P. D. Kratz
Executive Committee—F. C. Baselt, I. D. Garard, P. P. Gray, A. H. Johnson, F. K. Lawler
National Counselors—R. T. Bohn, S. L. Galvin, R. F. Ligie, B. L. Oser.

SOUTHERN CALIFORNIA

Officers for 1950-51 are:
Chairman—F. Leslie Hart
Chairman-elect—H. J. Deuel, Jr.
Secretary-Treasurer—Margaret G. Morehouse
Assistant Secretary-Treasurer—G. L. Merchant
Section Councilors—M. S. Dunn (1949-51); A. N. Prater (1949-51); M. S. Burns (1950-51); Ray Cox, alternate (1950-51)
Committee Chairmen—Annual Meeting, E. A. Beavens; New Food Fair, G. M. Cunningham; National Meeting, P. K. Bates
Executive Committee—F. H. Hunsicker (1949-51); P. J. Rich (1950-51); J. B. Pardieck (1950-52); J. S. Lawless (1950-52)); L. B. Rockland (1950-51).

WORLD PRODUCTION OF MARINE OILS, 1949

All Fats and Oils: World production of all fats and oils in 1949 (up 5 percent over 1948) exceeded the prewar level of production for the first time since the end of hostilities, states a March 6 release from the Office of Foreign Agricultural Relations, U. S. Department of Agriculture.

In general, 1949 saw the end of the acute shortage in world's supply of all fats and oils and the situation should improve further in 1950 when much of the 1949 production will be available for distribution.

In spite of these marked improvements, the world remains short of fats and oils, compared with the per capita level of consumption before the war, and even shorter if inadequate prewar diets for many people are taken into account.

Much of the increase in production since prewar has occurred in the United States and exports from the United States during 1949 made the largest single contribution to the alleviation of the world shortage. Indications are that United States exports will decline somewhat during 1950 because of the intensified shortage of dollar exchange in importing countries. This is likely to mean continued high prices in soft currency areas relative to prices in dollar areas.

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Marine Oils: In 1949, world production of marine oils (whale and fish), estimated at 684,000 short tons, was up 10 percent from that of 1948 though still well below prewar. This increase resulted principally from a substantial expansion in the production of fish oil—about one-fourth greater than in 1948.

The increase of whale oil output, however, was small because the catch of baleen whales during the 1948-49 Antarctic whaling season again was limited to a maximum of 16,000 blue—whale units under the regulations of the 1946 International Whaling Convention. Whale oil production varies little from year to year because of the limit placed on the pelagic whaling catch in the Antarctic. Exports of whale oil were slightly higher in 1949, compared to 1948.

World production of fish oil in 1949, estimated at 292,000 short tons, is the largest postwar output, but it still was 37 percent below the prewar average. Production in Canada (excluding Newfoundland) and the United States, the world's largest producer, probably did not exceed the 1948 output of 63,200 and 13,300 tons, respectively. Indications are that Norway, the United Kingdom, and possibly several other European countries increased their production in 1949. Newfoundland's fish oil output was considerably larger than a year earlier. Exports of the fish oils were down in 1949. Shipments from Iceland, the principle exporter, were almost 75 percent less than in the preceding year. —*Commercial Fisheries Review*, May, 1950.

GRADUATE ASSISTANTSHIP OPEN

Professor Richard H. Forsythe, Assistant Professor of Poultry Products Technology, Iowa State College of Agriculture at Ames, has a possible opening for a graduate assistant to work towards a Ph.D. in Poultry Products and Food Technology, for the next academic year (1950-51). Annual stipend would be around $800 to $1100, depending upon qualifications. B.S. or M.S. in Chemistry, Bacteriology or Food Technology required. For further details write to Professor Forsythe.

Now U.S. Gov't. o.k.'s Ac'cent in all prepared meats!

Recent Dept. of Agriculture memo* permits use of flavor-heightening monosodium glutamate in cured hams, bacon, corned beef

NOW—IN ALL YOUR prepared meat products—you may include Ac'cent, pure monosodium glutamate, the unique basic seasoning that remarkably heightens natural food flavors! Now, with *all* your prepared meat, you can enjoy the important sales increases that Ac'cent already is producing for others!

For, in a recent supplement to its Memorandum #147*, the Meat Inspection Division of the Department of Agriculture has officially approved the use of monosodium glutamate in the pumping pickle, cover pickle or dry cure mixture for all cured meats. Ac'cent previously had won approval in loaves, soups, stews, hash, sausage, luncheon meat and similar products. **Supplement No. 1, Memorandum No. 147, Meat Inspection Div., U. S. Department of Agriculture, June 6, 1950.*

AC'CENT BRINGS OUT MEAT FLAVOR — Adding no flavor, color or aroma of its own, Ac'cent heightens, to an amazing degree, the good, natural flavors already in meats and most other foods. Equally important — it holds those wonderful flavors . . . helps combat flavor-loss in processing. For Ac'cent, long used as a basic seasoning by chefs and gourmets, is monosodium glutamate in its purest form—99% pure, wholesome crystals derived from vegetable sources.

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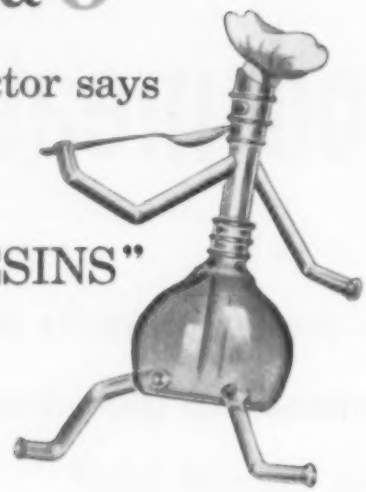

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SPISORESINS of all important spices such as Allspice, Cinnamon, Clove, Garlic, Nutmeg, Onion, Black Pepper and Sage are available. The Dodge & Olcott Laboratories have also developed sixty SPISORESINS MIXTURES including every important flavor used in the meat processing industry. Bologna, Braunschweiger, Deviled Ham, Liverwurst, Turkey Loaf and Salami illustrate the complete flavor range of SPISORESINS.

SPISORESINS, in addition to being paramount flavors, are easy to use. SPISORESINS are even-spreading of uniform strength, properly balanced and are free from the bacteria, molds and yeast spores frequently found in dry spices.

Practical suggestions for the use of SPISORESINS will be sent on request.

"D&O News", the Dodge & Olcott bi-monthly publication, is especially planned to provide timely and useful information on matters essential to the conduct of your business. Ask to be put on the mailing list.

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Notes and Letters

ON THE "SCUFFING" OF PAPER BAGS

During the past several years, the use of paper bags for packaging food products of many types has greatly increased, and seems likely to stay at a high level for some time to come. One of the difficulties experienced with the paper bag has been the relative ease with which bags are damaged.

One particular type of damage experienced when routing and switching paper bags from one conveyor belt to another during warehousing operations results from a tendency of the paper to scuff or peel to such an extent that the outer ply is badly torn, and printed areas often effaced. By the term "scuff" we are referring to a characteristic of the outer ply which involves the reaction of the surface to sliding under pressure imposed by handling equipment, and as regards the tendency of small abraded spots to enlarge in area and depth into the sheet.

To others experiencing difficulties of this nature, in greater or lesser degree, it may be of value to know of ways and means of overcoming this difficulty, to a large extent, without the necessity of specifying scuff-proof sheets that cost more. Available corrective measures are based on the following behaviour of natural kraft paper as established by observations and tests over a period of several years:

1. With any basis weight of paper, it has been established to our satisfaction that the felt side of the sheet shows less tendency to "scuff" than does the wire side of the sheet, and that the scuffing that does occur on the former is of a much less serious nature.

2. With any basis weight of paper, the scuffing is definitely directional. It is therefore possible to decrease, if not entirely eliminate, extensive scuffing damage by turning bags on the belt by 180° so that the direction of the sheet most resistant to scuffing receives the impact of forces responsible for the damage.

3. A 50-lb. basis weight paper is much less liable to scuff than a 60-lb-weight under similar conditions of use.

Thus, in many instances, the above knowledge of the behaviour of paper under conditions conducive to scuffing have been of value in economically utilizing material that would otherwise have to be scrapped. It can also be used to eliminate, on some items, the use of the special scuff-proof sheet commanding a premium over the natural kraft, and thus permit substantial economies to be effected.

W. W. McGimpsey
California and Hawaiian Sugar Refining Corporation, Ltd., Crockett, California.

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Authors of papers intended for publication in FOOD TECHNOLOGY should request from the Editor's office a copy of a booklet, tittled "Suggestions to Authors," and see that their papers are in the form specified therein before they are sent to the editor.

The Institute of Food Technologists assumes no responsibility for statements in contributed articles appearing in FOOD TECHNOLOGY. Editorials present only opinions of the writers and do not necessarily reflect policies of the Institute of Food Technologists.

Selected Abstracts

ANALYTICAL METHODS

288J. The colorimetric determination of aluminum in silicate materials.

ROBERTSON, G. *J. Sci. Food Agric., 1,* 59-63 (1950).

Two methods differ only in the reagent used to inhibit the iron color, the final pH of the lake and the amount of iron that can be present. Thioglycollic acid and hydroxylamine hydrochloride are used to prevent the formation of the color due to iron, thioglycollic acid being the more effective. As the solubility of the lake increases with increasing alkalinity, the pH in the alkaline method is carefully controlled at 7.5 ± 0.2 by means of ammonium borate solution. Other factors influencing color development are discussed. The limits of tolerance of elements that interfere in color production are given, and the application of the methods to the determination of aluminum in soil extracts, soils and clays is described.

289J. Determination of ethylene oxide and methods of its recovery from fumigated substances.

KHISHEN, S. A. E. *J. Sci. Food Agric., 1,* 71-7 (1950).

Previous attempts to determine ethylene oxide are surveyed and critically investigated. New methods of analysis have been suggested and certain modifications of existing methods applied to suit conditions of experiments. New methods for the detection and approximate determination of the fumigant in an atmosphere containing the gas have been established. Methods of recovery of ethylene oxide from grain and sultanas have been studied; part of the oxide has been shown to be readily recoverable and the remainder only with great difficulty.

290J. The determination of ascorbic acid in the presence of ferrous salts, with particular reference to canned foods.

BROWN, F., AND W. B. ADAM. *J. Sci. Food Agric., 1,* 51-3 (1950).

The interference of ferrous iron in the titration of ascorbic acid in a metaphosphoric acid medium with 2:6 dichlorophenol-indophenol can be avoided by the use of other acid media. The present work shows that the use of a sodium acetate-hydrochloric acid buffer of pH 0.65 instead of the more usual metaphosphoric acid, as an extractant for canned foods, avoids the complications due to ferrous salts. The stability of ascorbic acid in the two media is similar.

291J. The determination of the true iodine numbers of oils containing conjugated double-bond systems.

KLEE, L., AND G. H. BENHAM. *J. Am. Oil Chem. Soc., 27,* 130-3 (1950).

The modified Rosenmund-Kuhnhenn procedure has been applied to conjugated systems. The only difference is that the 1-minute reaction time is extended to 30-120 minutes depending upon sample weight and excess reagent. Such a procedure gives true iodine numbers and has been investigated for various tung oils, oiticica oil, isomerized fatty acids, and dehydrated castor oil.

BIOLOGICAL SCIENCES

BIOCHEMISTRY

292J. Browning of ascorbic acid in pure solutions.

LAMDEN, M. P., AND R. S. HARRIS. *Food Research, 15,* 79-89, Jan., Feb., 1950.

The water of crystallization of citric acid ($C_6H_8O_7H_2O$) promoted browning of a powdered mixture of ascorbic acid and citric acids at 49° C. Ascorbic acid-citric acid solutions containing increasing amounts of citric acid, and heated three hours at 100° C., showed an increased optical density (at 410 mμ) and decreased ascorbic acid content with increasing concentration of the citric acid. Malic, tartaric, and oxalic acids also caused color formation when heated with ascorbic acid at 100° C. Neither color formation nor loss in ascorbic acid depended on the presence of oxygen, during heating of highly acidic solutions of ascorbic acid. Sulfur dioxide prevented formation of color in ascorbic acid solutions. Sulfur dioxide probably does not function as an antioxidant in this reaction. Color formation was demonstrated to be a function of the initial ascorbic acid content in highly acidic ascorbic acid solutions heated at 100° C. Furfural was formed when an ascorbic-citric acid solution was boiled. It was not formed when a dehydro-ascorbic acid solution was boiled. Oxygen was consumed and carbon dioxide was evolved at a linear rate when an ascorbic-citric acid solution was heated at 60° C. Approximately half the carbon dioxide theoretically obtainable from the ascorbic acid destroyed was accounted for. The remainder may have been present as an ascorbic acid transformation product or products not yet decarboxylated. There was no measurable decomposition of citric acid during browning of a heated ascorbic-citric acid mixture. Rate of loss of ascorbic acid in highly acidic solutions indicated the reaction was monomolecular. The bearing of these results upon the browning reaction noted in dehydrated citrus products is discussed.

293J. The enzymatic degradation of ascorbic acid. Part I.—The inhibition of the enzymatic oxidation of ascorbic acid by substances occurring in black currants.

HOOPER, F. C., AND A. D. AYRES. *J. Sci. Food Agric., 1,* 5-8 (1950).

The ascorbic acid in black currants is very stable. It has been found that this fruit contains substances which inhibit the oxidation of ascorbic acid by the enzyme systems of Bramley apples. Partial separation of the active substance into two main fractions has been achieved. The one is associated with the anthocyanin pigments, and the other is associated with the yellow flavanone pigments which resemble "vitamin *P*."

294J. The comparative biochemistry of vitamin function.

BEERSTECHER, JR., E. *Science, 111,* 300 02 (1950).

Vitamins are classified into two groups. The B vitamins are associated with fundamental metabolic app. of living cells, whereas the other vitamins appear to have only highly specialized functions for certain tissues and cell groups.

295J. Composition of linseed mucilage.

EASTERBY, D. G., AND J. K. N. JONES. *Nature, 165,* 614 (1950).

Mucilage obtained from sperms of linseed has been acid hydrolized and paper chromatographed. No glucose was found in the acid hydrolyzate. Galactose, arabinose and rhamnose were found in quantity. A trace of ribose or fucose was suggested.

MICROBIOLOGY

296J. Bacterial aspects of precooked frozen foods.

GUNDERSON, M. F., H. W. MCFADDEN, JR., AND G. MINTHORN. *Bibl. Tech. Rept., 18,* 163, PB 98218 (1950).

A review correlating in abstract and bibliography form, the great maze of material which has gradually accumulated in the literature throughout the years. Additions will be appended from time to time.

297J. Studies on putrefactive anaerobes as spoilage agents in canned foods.

ASCHEHOUG, V., AND E. JANSEN. *Food Research, 15,* 62-7, Jan., Feb., 1950.

On examination of 13 different kinds of canned foods, including marine products as well as meat and vegetables, the most important spoilage agents were flat-sour-producing bacteria. Second in order to the flat-sour organisms were the putrefactive anaerobes, of which *Cl. parasporogenes* and *Cl. sporogenes* were typical representatives. The spores possess

(Continued on page 10)

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News of the Institute

BRIEF HISTORY OF THE CHICAGO SECTION, I. F. T.

E. S. STATELER

EDITOR'S NOTE: During the Tenth Annual I. F. T. Meeting held in Chicago, Illinois, Mr. Stateler, Associate Editor of Food Industries and a former chairman of the Section, presented an outline of the organization and history of this important segment of the Institute. The following is the text of Mr. Stateler's talk, delivered at the Nicholas Appert Medal Banquet on May 23, 1950.)

MRS. RECTOR, MR. PRESIDENT, MEMBERS, AND GUESTS:

Yesterday, many of you learned from Dr. Prescott some of the mile-posts in the growth of the Institute as a national organization.

Tonight, attention will be focused for a few minutes on its local growth, as represented by the Chicago Section, the possessor of Regional Section Charter No. 1.

By drawing this parallelism, we wish to indicate that the Chicago Section had its conception almost with the birth of the Institute. True, no organizational move was made immediately. However, that delay does not necessarily indicate non-existence of the idea of a Chicago Section at the time the Institute was founded. As usual with all new organizations, some lapse of time was necessary to get group activities under way. I repeat: To a large extent, the history of the Chicago Section is that of the Institute and vice versa. Both have evolved step by step over these past ten years. Many of the policies of the Institute have developed out of the experiences of the Chicago Section and have been applicable to all regional sections. Conversely, the Chicago Section has benefited from the early experiences of the Institute; particularly with respect to avoiding large committees and to giving young and new members places on committees. Further, the portion of the I. F. T. Constitution pertaining to regional sections is essentially a verbatim inclusion of the By-laws of the Chicago group; first identified as the Chicago Association of Food Technologists.

I have used the verb "evolved" advisedly. Who originated the concept of a Chicago Section is unknown to me; probably unknown to anyone. Very likely, the concept had its origin in conversations among those engaged in food technology in the Chicago area. Such a beginning has been the case with other developments in the life of the Section.

The first recorded evidence is found in the minutes of the October 13, 1939, meeting of the Institute Council in Pittsburgh, Pa. In those minutes is a letter from E. H. Harvey to Roy C. Newton, then vice president of the Institute, expressing the desire of Chicago food technologists to be host to the First Annual Conference. Acceptance of the invitation included the naming of Harvey as Chairman of the Local Arrangements Committee. In the capacity of Chairman of the Committee, Harvey met with 24 others on the evening of November 8 to lay preliminary plans for the 1940 Conference. Those in attendance were:

> Edward G. Applegate, Oscar Mayer & Co.; J. Raymond Chittick, Jaques Manufacturing Co.; Victor Conquest, Armour and Company; George A. Crapple, Wilson & Co.; William D. Dotterer, Bowman Dairy Co.; Lloyd A. Hall, Griffith Laboratories, Inc.; G. Victor Hallman, Continental Can Co.; Lloyd B. Jensen, Swift & Co.; R. W. Johnson, Continental Can Co.; I. O. Juvrud, W. E. Long Co.; James W. Kellogg, Institute of American Meat Packers; John T. Knowles, Libby, McNeill & Libby; Fred W. Kurk, Wilson & Co.; Milton L. Laing, Armour and Company; Cyrus C. Lippman, Libby, McNeill & Libby; Roger H. Lueck, American Can Co.; Harold S. Mitchell, Swift & Co.; Roy C. Newton, Swift & Co.; Ferdus N. Peters, Quaker Oats Co.; Lloyd K. Riggs, Kraft-Phenix Co.; H. B. Ritchie, Swift & Co.; E. S. Stateler, Food Industries; Lucius M. Tolman, Wilson & Co.

They included chemists, bacteriologists, and engineers; not convention promoters, not Chamber of Commerce boosters accustomed to staging conventions or annual meetings.

Decision was made to have the committee meet monthly to receive progress reports from the six subcommittees and to start additional plans. These additional plans implemented and supplemented the work of the subcommittees.

In the course of the December 6 meeting, addressed by Dr. Prescott on "The Food Technologist and His Work," the first step was taken to organize a Chicago Association of Food Technologists. Membership in the proposed association was to be limited to Institute members in the Chicago metropolitan area. Harvey was designated Temporary Chairman, and George Crapple, Temporary Secretary.

Treasurer? There was none; the committee had no funds. Also, the proposed new organization had no authority to fix dues or set up means of collecting funds. Meeting notices consisted of telephone calls and verbal messages passed along to individuals likely to be interested. Expenses of the early meetings were covered by an extra charge to those participating in a group dinner.

In this manner began the custom of a monthly dinner meeting consisting of a business session and a technical session. Publicity for the Annual Conference began with news releases reporting these monthly meetings to about 100 technical and business publications. Attendance at the first meeting totalled 35 and progressively increased at each meeting.

By February, 1940, a set of By-laws had been drawn up and adopted, an election of officers, including a treasurer, had been held under the By-laws, and an annual dues of $1 per member had been voted. Post card notices of meetings were started, and individuals from Milwaukee and Madison, Wis., Champaign and Peoria, Ill., Lafayette and Indianapolis, Ind., and East Lansing, Battle Creek, and Fremont, Mich., began to attend the monthly meetings.

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LTIES • WIENERS • CANNED SOUPS • PICKLES • CATSUP • PORK SAUSAGE • RELISH • MINCED HAM
PS • MAYONNAISE • PORK & BEANS • SALAD DRESSINGS • CHILI SAUCE • BARBECUE SAUCE •
S • MEAT SPECIALTIES
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Abstracts

(Continued from page 6)

great heat resistance and are widely distributed in nature. The concentration of spores in the medium influences the heat resistance.

NUTRITION

298J. The comparative availabilities of mixtures of the L and DL modifications of the essential amino acids for growth in the rat.

VAN PILSUM, J. F., AND C. P. BERG. *J. Biol. Chem. 183,* 279-89 (1950).

Contrary to the often repeated conjecture that the D forms of the essential amino acids may be toxic in the rat, proportionately large amounts can actually be fed as components of DL-amino acid mixtures without producing any apparent growth-retarding or other deleterious effect. Moreover, when fed in excessive amounts, the L form of an amino acid may, as has been shown in the case of methionine, be even more deleterious than its D modification.

299J. Comparison of meat and legumes in a controlled feeding program.

MACK, P. B. *J. Am. Diet. Assn., 25,* 848-57 (1949).

Two groups of institutional children of similarly poor initial nutritional status were fed dietaries over a fourteen-month period which were closely similar, except for the fact that one group received meat two and the other ten times weekly. The first group consumed legumes and other vegetable products to an extent which compensated on a calculation basis for the nutritive content of the meat. Both dietaries met specified recommendations, and the low-meat dietary followed a pattern frequently recommended as a low-cost adequate dietary. Liver constituted one-tenth of the meat intake in each dietary. The children on the higher meat dietary were superior in epithelial cell condition; in condition of the skin; in reversal of atrophy of the filiform and fungiform of the tongue; in reduction in enlargement of certain glands; in skeletal mineralization; in age schedule of development (growth) according to the Wetzel Grid; in hemoglobin; in red cell count; in level of blood plasma vitamin A; in certain serum protein fraction relationships; in blood phosphatase; in urinary excretion of thiamine (slightly) and of riboflavin (markedly); in reflexes; in absence of fatigue; and in dark adaptation. During a second fourteen-month period, the children in the institution formerly on the low-meat and high-legume intake followed the higher meat dietary and vice versa. The reversal in the dietaries was accompanied by a reversal in certain physical status findings, as follows: The institutional children on the higher meat intake were superior to the other group in condition of epithelial tissues; condition of the tongue; freedom from nasal discharges (not a common cold); freedom from cerumen in the ears; condition of the cervical glands; condition of the skin; growth; and skeletal mineralization. Again, the low-meat group was not superior to the higher meat group in any physical respect.

PHYSIOLOGY

300J. Cyanide protection against X-irradiation.

BACQ, Z. M., A. HERVE, J. LECOMTE, AND P. FISCHER. *Science, 111,* 356 (1950).

Cyanide protects a significant percentage of mice irradiated by a lethal dose of X-rays. The cyanide is ineffective when given after irradiation.

FOOD PRODUCTS

BAKING AND BAKERY PRODUCTS

301J. Egg white, its advantage in white layer cakes.

GLABAU, C. A. *Bakers Weekly, 146,* 46-8 (1950).

Increased amounts of egg white in standard white cake formulas produced improved cake scores, increased volume and increased tenderness.

302J. The determination of extraneous materials in biscuits.

COPPOCK, J. B. M., AND R. C. A. BRADSHAW. *J. Sci. Food Agric., 1,* 57-9 (1950).

A method is described for examining biscuits, with and without chocolate couverture, for the presence of extraneous materials such as rodent and other animal hairs, insect fragments and mold spores. The application of this method to the problem of "good housekeeping" in this type of food manufacturing is briefly discussed.

FROZEN FOODS

303J. The production of "amber whites" in shell eggs by freezing and thawing.

HALE, H. P. *J. Sci. Food Agric., 1,* 46-8 (1950).

Some eggs recently imported into the United Kingdom under refrigeration were characterized by amber-colored whites and enlarged yolks. The pH of white and yolk, also the lipoid- and water-content of the yolk were abnormal. It has been reported that a similar condition arises during the cold storage of eggs laid by hens that have eaten malvaceous plants, seeds or oils. It has now been shown that the same abnormalities result if normal eggs are frozen above —6° C. and stored in the thawed state. It is suggested that "amber whites" are not always caused by the diet of the hen.

304J. Retention of riboflavin in vegetables preserved by freezing.

VAN DUYNE, F. O., J. C. WOLFE, AND R. F. OWEN. *Food Research, 15,* 53-61, Jan., Feb., 1950.

The mean values and standard deviations of the means for riboflavin contents of the raw, freshly harvested peas, snap beans, soybeans, and spinach are given. The riboflavin content decreased during blanching, blanching and cooling, and blanching, cooling, and holding for approximately 29 hours in the freezing unit. No further loss occurred during freezer storage for periods of 1, 3, 6, and 9 months.

305J. Effect of freezing rate on meat. Appearance, palatability, and vitamin content of beef.

LEE, F. A., R. F. BROOKS, A. M. PEARSON, J. I. MILLER, AND F. VOLZ. *Food Research, 15,* 8-15, Jan., Feb., 1950.

Rate of freezing was shown to have little effect on the flavor, odor, texture, juiciness, or appearance of beef. Neither thiamine, riboflavin, niacin, pantothenic acid, nor pyridoxine were measurably altered by the rate of freezing.

MILK AND DAIRY PRODUCTS

306J. Problems of the milk sanitation program.

WEBB, J. A., AND H. L. RAGSDALE. *J. Am. Vet. Med. Assn., 66,* 275-7 (1950).

Approximately 90% of all milking is done by machines; consequently it is imperative that these be kept as sanitary as possible. The rubber parts of milking machines are often ideal lodging spores for multiplication of bacteria.

PACKAGING

307J. Trace metals in food packaging.

THOMPSON, J. B., AND R. B. KOCHER. *Mod. Pack., 23,* 119-22, May, 1950.

The trace metal content of packaging materials is identified as an important factor in accelerating deterioration in certain foods. Products high in protein or fat have been found to be particularly susceptible to this type of deterioration. Iron and copper are common sources of trouble. Further research is indicated.

Abstracts

308J. A new collapsible tube.

Mod. Pack., 23, 78-83, May, 1950.

The manufacture and uses—actual and potential—of a radically new type of collapsible tube, convolutely wound from a printed sheet of laminated aluminum foil. The body, neck, and threads are all formed from the original sheet material. Bottom closure is affected by the conventional crimping operation after filling.

309J. First production line application of polyethylene liners in tin cans.

Pack. Parade, 18, 46, May, 1950.

Corrosive liquids formerly shipped only in glass may now be shipped in tin cans resulting in considerable savings in shipping costs. Package consists of an ordinary tin can into which is inserted a polyethylene bag. A flat sheet of film is placed over the top of the can followed by the usual metal lid. The bag, gasket and lid are crimped in a conventional sealer and the excess film is then burned off.

PATENTS

310J. Frozen lobster method.

ALTENBURG, W. M. Assignor to GI's Incorporated 2,501,655, Mar. 28, 1950.

The method of preparing fresh raw lobster in the shell for cold storage which comprises heating the exterior of the lobster just sufficiently to sear the surface of the meat next to the shell without cooking the interior meat, thereby loosening the meat from the shell, then cooling and rapidly freezing the lobster.

311J. Process of partly dehydrating meat.

ZIMMERMAN, S., 2,502,115, Mar. 28, 1950.

In a process for obtaining partly dehydrated preserved meat, the steps of salting meat and dehydrating the salted meat in the presence of an edible fatty substance in a vacuum at temperatures above the boiling point of water for the particular degree of vacuum employed, and interrupting the treatment when the water content of the meat is about 20 to 30%.

312J. Apparatus for decapitating fish.

SAVRDA, C. M. Assignor, by mesne assignment, to Fish Machinery Corporation, 2,502,175. Mar. 28, 1950.

A fish decapitating machine comprising a pair of parallel endless chains constituting a conveyor, a plurality of fish carriers, each of said fish carriers having a head-supporting portion secured to one chain, and a body-supporting portion secured to the other chain, said portions lying in the same plane but being spaced from one another to form an intervening straight channel extending parallel to said chains, said channel being disposed nearer to said one chain than to said other chain, rear flanges extending upwardly from said supporting portions, said flanges being inclined relative to one another and the flange on said body-supporting portion being inclined forwardly relative to a vertical plane perpendicular to said channel and passing through the rear end of said channel whereby when a fish is disposed on said carrier with its back in contact with said rear flanges the backbone will be inclined relative to said channel, a rotary circular knife adapted to pass through said channel when a fish carrier passes through the zone of action of said knife and means to drive said conveyor to cause said fish carriers to pass successively through the zone of action of said knife to decapitate fish carried on said carriers by a cut extending from the belly side to the back side at an angle to the backbone of each fish.

313J. Fish-filleting machine.

SAVRDA, C. M. Assignor, by mesne assignments, to Fish Machinery Corporation, 2,502,176. Mar. 28, 1950.

A feeding apparatus comprising a pusher finger adapted to engage the article to be fed at the rear thereof, a slidably mounted pusher finger plate carrying said pusher finger, a continuously driven chain conveyor, a pair of longitudinally spaced sprockets about which said chain conveyor travels, means securing said pusher finger plate to a link of said chain conveyor, a bracket secured to a chain link rearwardly of the first-mentioned chain link, and a pusher link pivotally connected to both the pusher finger plate and said bracket whereby when the pitch radius between said sprocket and bracket is changed the pusher plate is slidably moved in accordance therewith.

314J. Method of sterilizing food products.

BALL, C. O. Assignor to The United Products Company, 2,502,196, Mar. 28, 1950.

The process of sterilizing a composite culinary product containing 30 to 65% of discrete particles of a food product and the remainder a sauce containing 8 to 90% of a finely divided food product in added liquid, said process comprising sterilizing said composite culinary product in a container, while said added liquid contains not more than 35% of its weight of said finely divided food product and while said discrete particles and the remainder of said finely divided food product are substantially stratified in layers.

315J. Ice cream and stabilizer therefor.

WERBIN, S. J. Assignor to Stein, Hall & Company, 2,502,-397, Mar. 28, 1950.

An ice cream mix, stabilized by the presence of a relatively small quantity of guar seed gum.

316J. Method of extracting vitamin A from cow livers.

STEVENS, W. Assignor, by mesne assignments, to Hartford National Bank and Trust Company. 2,503,853, Apr. 11, 1950.

The method of preparing a vitamin A concentrate from cow livers poor in fat, comprising the steps of subjecting the animal material to the action of a partially water miscible organic solvent selected from the group consisting of methylethylketone, isobutanol, butanol-2, n-butanol, and n-pentanol-2 saturated with water to denaturate the albumins while dissolving the lipoids to produce an extract of the material containing vitamin A, and expelling the solvent to recover the vitamin A concentrate.

317J. Neutralization of pectinic acids with sodium bicarbonate.

GRAHAM, R. P., AND A. D. SHEPPHERD. Assignor to United States of America. 2,503,258, Apr. 11, 1950.

A process of preparing a partially-neutralized, low-methoxyl pectinic acid in granular, free-flowing form which comprises mixing a low-methoxyl pectinic acid gel having a moisture content from 40% to 72% with solid sodium bicarbonate and drying the resulting product.

318J. Process for preserving animal fats.

DUNKLEY, M. E. 2,504,507, Apr. 18, 1950.

In a process for the treatment of fatty animal tissue, removing fat from the tissue by heat treatment of the same, and then commingling the removed liquid fat with bubbles of a gas consisting of products of combustion analyzing substantially 8.2% carbon dioxide, 0.1 to 0.2% acetylene, 0.2 to 0.1% oxygen, 3.8% carbon monoxide, 2.2% methane, and 85.5% nitrogen.

319J. Process of manufacturing stabilized nut butters.

AVERA, F. L. Assignor to Rosefield Packing Company, Ltd. 2,504,620, Apr. 18, 1950.

A process of preparing a stabilized nut butter comprising introducing into the components of a nut butter during the manufacture thereof an hydrogenated oil stabilizer containing an edible oil which has been hydrogenated only to the point of maximum trans 9, 10 octadecenoic formation.

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News of the Institute

(Continued from page 8)

This widening in interest in the Association activities encouraged a change in name to that of Midwest Association of Food Technologists. Although membership in the Association was limited to those holding membership in the Institute, all meetings were open to anyone sufficiently interested to attend. Meeting notices were mailed to only those paying the annual local dues. These practices have continued since the Section was chartered.

This open meeting policy has proved beneficial to the Section and to the Institute. Voluntary requests for I. F. T. membership application forms increased with the number of monthly meetings held; even in the absence of a local membership committee. Tangible results are indicated by the increase of I. F. T. membership in the Chicago area from about 25 in November, 1939, to over 150 in June, 1940. Present Chicago Section membership exceeds 400 in spite of losses of territory and membership to the Great Lakes and Ames Sections. These Sections were formed with our blessing. Although no concerted drive for members has been made by the Chicago Group and Section, encouragement to join the Institute has been made to those regularly attending the monthly meetings. These meetings are held during October to May inclusive. Applications for local associate membership in the Section are acceptable for Executive Committee action, but not urged. Preference is to build the membership of the Institute, rather than to add local or regional associates to the Section membership.

A measure of the success of the 1940 Conference plans was the attendance by 495 registrants which was up to the expectations of the Chicago group. A satisfying reward was sufficient income from the registrations and exhibits to more than pay all expenses incidental to the Conference; including printing of the souvenir program and transportation for the Institute President and Secretary. Since the Institute was low in funds, the Chicago Group wanted the Conference to be wholly self-supporting.

The pre-Conference interest in monthly meetings encouraged continuance of them with a change that the program for the technical session be limited to one speaker. Attempts to cover the chemical, biological, and engineering aspects of food technology in one evening proved unsatisfactory; the meetings were too long and wearisome.

Our account thus far has emphasized the formation of the Chicago Association and the staging of the First Annual Conference of the Institute. This emphasis is as it should be. During those seven months was laid the foundation for the Chicago Section, the establishment of group policies, and the close working relationships and friendships among and between the Chicago food technologists. These relationships have made further growth and accomplishments logical and practically inevitable.

Evidences are found among the following:

1. Petition to and acceptance on January 21, 1941, by the Council to be recognized and chartered as Regional Section No. 1 of the Institute.

2. Establishment of the Nicholas Appert Medal in 1941 with first award to be made at the 1942 Annual Conference and annually thereafter.

3. Membership in the Chicago Technical Societies Council and participation in its technical conferences.

4. Participation in Sunday lecture series at Museum of Science and Industry.

5. Staging of the 1944 Conference with a record-setting registered attendance of 727 in spite of war conditions.

6. Establishment of a Section Committee on Professional Status and Public Relations.

7. Organization of a Speakers' Bureau to supply voluntary speakers on food technology subjects to civic, educational, and professional groups in Chicago metropolitan area.

8. Participation in Vocational Guidance Clinic for high school juniors and seniors at Illinois Institute of Technology.

9. Founding of the *Vitalizer*, the self-supporting publication of the Section.

10. Staging of the present (1950) Decennial Conference of the Institute.

None of these accomplishments can be attributed to any one individual nor to any group of individuals. They represent the thinking and working together of the Chicago Section members as individuals and as represented by elected officers and Executive Committee members. These individuals represent cross sections of the Section membership with respect to professional training and experience, field of professional work, and age groups. Their identity changes after one term of office, except in cases of Secretary and Treasurer. They obtain their recognition through work as members of committees, chairmen of committees, attendance at meetings, and general interest in Institute and Chicago Section affairs.

These accomplishments also give testimony to the support given by the Section members to the elected officers and Executive Committees.

The roster of Section Chairmen is:

E. H. Harvey, G. V. Hallman, M. E. Parker, M. L. Laing, J. T. Knowles, R. V. Wilson, C. C. Ziegler, E. S. Stateler, C. L. Smith, R. A. Isker.

At no time during these ten years has any Chairman or other elected officer failed to carry out the authorizations of the Executive Committee and/or of the Section members, even though he might not personally be in favor of those authorizations. Also, in no instance has the Chairman or other officer of the Section sought to impose his thinking or wishes upon the Section, except through majority support by the Executive Committee.

These statements are made to emphasize the fact that actions of the Chicago Section are those authorized and supported by a majority of the members through their elected representatives on the Executive Committee and/or when assembled in a regular meeting. In no instance has the minority in an Executive Committee vote failed to support and to help put into execution a policy or project authorized by a majority vote.

Because and only because of this team-work relationship among the officers, Executive Committees, and Members has the history of the Chicago Section during these past ten years been so fruitful.

(Continued on page 20 following technical papers)

SINGLE KITCHEN TO SERVE PAN AMERICAN

According to a news story carried in the *New York Times* on July 9, 1950, a single food kitchen operated by the Pan American Airways at La Guardia airport will prepare meals to be served over half the face of the earth. This means that passengers flying as far east as Lisbon, Portugal, and Dakar, French West Africa, and as far south as Buenos Aires and Johannesburg, South Africa, will be served meals cooked and frozen here. As Mr. Kenneth Parratt, Pan American service manager pointed out to the *New York Times* reporter, one of the most important gains of the new service will be complete quality control. The highest quality foods will be purchased by the airline's own buyers, he said. In addition, wastage can be reduced greatly and production can be scheduled eight hours a day to save extra labor costs and sustain production.

The meals prepared by Pan American will be cooked and frozen at the La Guardia airport kitchen. Each meat and vegetable will be packaged separately in aluminum containers for freezing. The airline expects to serve about 20,000 meals a month from here.

Average flights from New York carry about 120 meals for the first lap of the flight, after which supplies will be drawn from the freezers as needed. The Pan American Airliners carry two electric element ovens equipped with fans for even heat distribution. These can prepare in flight 24 meals in about 12 minutes. Experiments have shown that faster preparation results in burning. Levened bread, sweet rolls and other food can also be cooked in the ovens.

Up to the present time, the line has been supplied here with foods by independent vendors except for supplies for a number of planes. The food for these latter has come from the La Guardia kitchen during a trial period since the first of the year. According to Mr. Parratt, sufficient evidence has been now gathered to assure that by using the pre-cooked frozen food substantial improvements in quality and savings can be attained. Similar experiments have been made before but the scope of Pan American's operation has never been paralleled in the history of the food industry.

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For that perfection in food flavor which assures enthusiastic consumer acceptance and continuing demand . . . many food processors have already found Huron MSG and Huron HVP valuable aids in raising flavor levels.

Huron's specialized service is always available to suggest ways of obtaining maximum taste value consistent with economy through use of Huron MSG and HVP.

To those who have not used our service, we suggest a simple way in which you can prove the advantage of using Huron MSG and HVP. For example, in . . .

MEAT PRODUCTS:

To corned beef hash and hamburgers add 0.15% MSG. In stews and meat and vegetable mixtures use MSG from 0.1% to 0.2%. For those meat and vegetable mixtures with strong, braised meat flavors, Huron HVP products are more suitable. While these are prepared as liquids, pastes and powders, the liquid HVP is more convenient for use in the products above at levels ranging from 0.5% to 2.0%.

In sausages, wieners, loaves and similar meats, use MSG at levels from 0.1% to 0.3% Dark colored and more highly seasoned sausage products more effectively use Huron HVP powders from 0.1% to 0.5%. Hams and bacon are improved by the addition of 0.1% MSG, introduced through the curing pickle.

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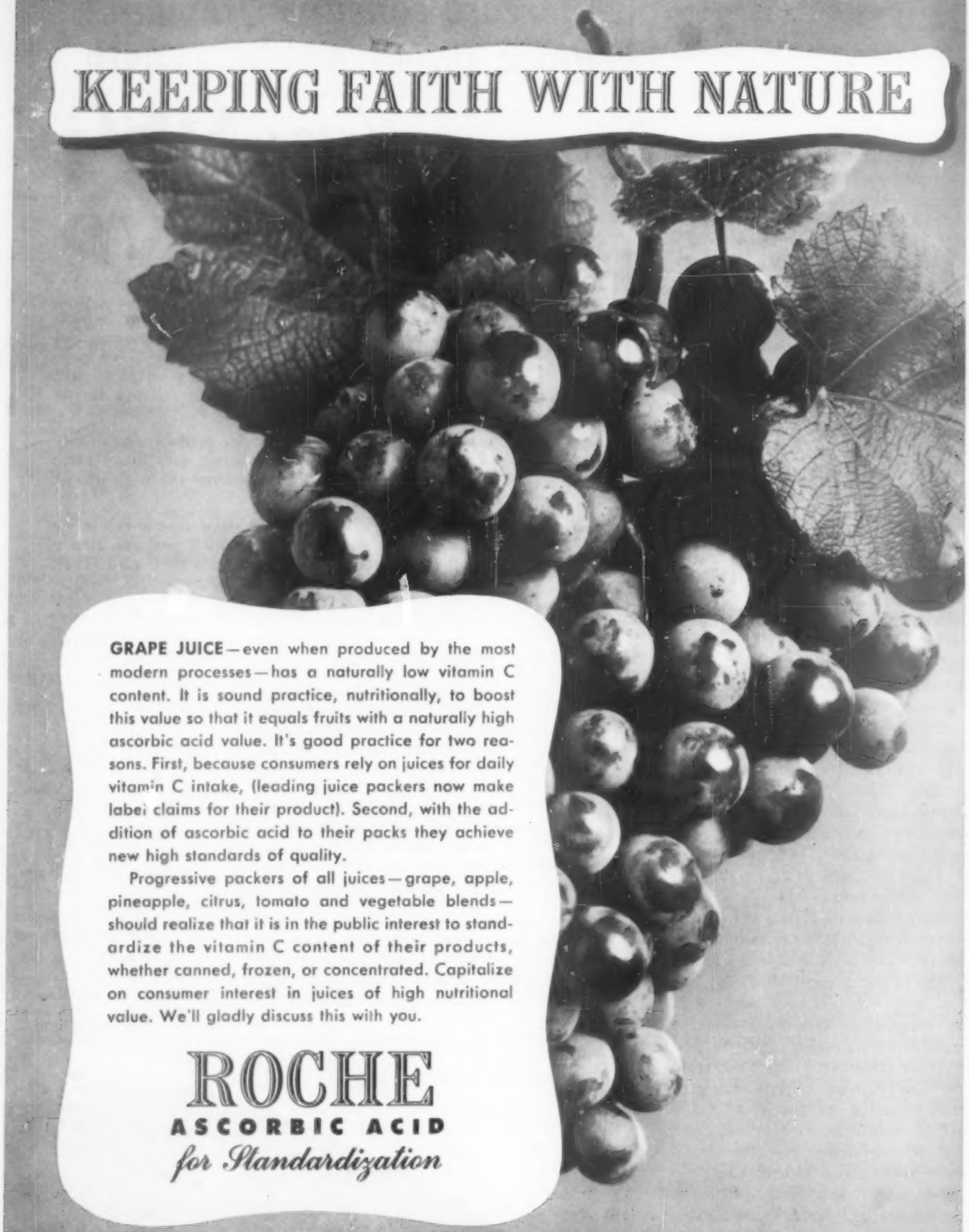

GRAPE JUICE—even when produced by the most modern processes—has a naturally low vitamin C content. It is sound practice, nutritionally, to boost this value so that it equals fruits with a naturally high ascorbic acid value. It's good practice for two reasons. First, because consumers rely on juices for daily vitamin C intake, (leading juice packers now make label claims for their product). Second, with the addition of ascorbic acid to their packs they achieve new high standards of quality.

Progressive packers of all juices—grape, apple, pineapple, citrus, tomato and vegetable blends—should realize that it is in the public interest to standardize the vitamin C content of their products, whether canned, frozen, or concentrated. Capitalize on consumer interest in juices of high nutritional value. We'll gladly discuss this with you.

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CONSTITUTION

Institute of Food Technologists

Adopted August 20, 1950

ARTICLE I

Name

The name or title by which this corporation shall be known in law shall be the Institute of Food Technologists, Inc.

ARTICLE II

Address of Institute

The executive office of the Institute shall be located in Chicago, Illinois. The Institute may have other offices within or without the State of Illinois, as the Council may from time to time determine.

ARTICLE III

Corporate Seal

The corporate seal shall be circular in form and shall have inscribed thereon the name of the association, the year of its incorporation, and the words: "Corporate Seal, State of Illinois."

ARTICLE IV

Objectives

The particular business and objectives of said corporation shall be a non-profit, professional educational association to promote the application of science and engineering to the production, processing, packaging, distribution, preparation, and utilization of foods; by stimulating investigations into technological problems arising therein, and providing a medium for promulgating and discussing the results of such investigations; by stimulating and providing means for the free interchange of technological information and ideas among food technologists; by promoting recognition of the role of food technologists in the technical direction of operations in these fields; all of these endeavors having the ultimate objective of providing better and adequate foods for mankind.

ARTICLE V

Definition of Food Technology

Food Technology may be defined as the application of science and engineering to the production, processing, packaging, distribution, preparation, and utilization of foods. Knowledge of food technology enables its possessor to solve technological problems in one or more of these fields by the application of one or more of the physical or biological sciences, or branches of engineering. It may involve problems in the development of products, processes or equipment; the selection of raw materials; the fundamental changes of composition or physical condition prior to, during, and subsequent to industrial processing; or the nutritional value and health safety of foods.

ARTICLE VI

Memberships

Section 1. *Classes of Members.* The Institute shall have three classes of members: Professional Members, Members, and Student Members. The Council shall determine the class of membership to which an individual is entitled. Wherever used in this Constitution, when referring to members of the Institute or classes of memberships, the words "member" or "membership" if not capitalized or otherwise qualified, shall mean members or memberships of all classes except Student.

Section 2. *Professional Members.* Any person who is ethically qualified, and who has had training and experience in food technology as defined in Article V, or any person who in the opinion of the Council is recognized as distinguished in the contributing sciences as they apply to foods, shall be eligible to be a Professional Member of the Institute. The minimum training which shall qualify a candidate for eligibility for Professional Member is, in general, graduation from a college, university, or similar institution in which he has majored in one or more of the sciences or branches of engineering associated with food technology. The minimum experience which shall qualify a candidate for eligibility for professional membership shall be three years experience in food technology. The Council may, at its discretion, waive any or all of the foregoing requirements in the case of a person who, through long experience has distinguished himself in the field of food technology.

Section 3. *Members.* Any ethically qualified person, active in special or limited aspects of food technology as defined in Article V, who is an administrator, director or executive under whose jurisdiction operations in food technology are conducted; or who is engaged in the dissemination of knowledge of food technology; or one whose work requires a general knowledge of the broad principles of food technology as it applies to the products, processes or equipment with which he or she is concerned; or one scientifically trained in and who has entered a career in food technology; shall be eligible to become a Member.

Section 4. *Student Members.* Any ethically qualified person who has never been a Professional Member or Member of the Institute, who is registered as a student in an educational institution with at least Junior (third year) standing, who is a candidate for a Bachelor's or higher degree in one or more of the sciences or branches of engineering associated with food technology, shall be eligible for membership as a Student Member. This classification shall be his status only until the end of the calendar year in which he completes his schooling. When graduated and otherwise qualified as defined in Section 3 of this Article, a Student Member may, upon application, be elected to Membership.

Section 5. *Membership Privileges.* All classes of members shall enjoy the privileges of the Institute with the following exceptions:

a. Only Professional Members may hold the following offices or appointments:

(1) President
(2) President-Elect
(3) Councilor-at-Large
(4) Regional Section Councilor
(5) Regional Section Chairman
(6) Member of the Committee on Programs
(7) Member of the Committee on Qualifications
(8) Member of the Committee on Nominations

b. Only Professional Members may vote in National elections or on Institute matters.

c. Members may hold Regional Section offices other than Chairman or Regional Section Councilor, and may vote in Regional Section elections and on Regional Section matters.

d. Student Members are not eligible to hold office in or vote on Institute or Regional Section matters.

Section 6. *Membership Applications.* The Executive Secretary shall supply suitable application forms to persons who are seeking membership in the Institute. An applicant for membership shall be considered nominated when three members who know him personally or by general reputation have endorsed his application. An applicant for Student membership shall be con-

sidered nominated when one or more members who are members of the faculty of his educational institution have endorsed his application.

Section 7. *Dues.* Professional Members, Members, and Student Members shall pay such dues as may be determined by the Council.

Section 8. *Withdrawal of Membership.* Any type of membership shall terminate by death, voluntary withdrawal, or otherwise, in pursuance of this Constitution. The right of a member to vote, and all other rights, privileges and interests in the Institute, its rights, privileges, and property, shall cease upon termination of membership. Any member may, by giving written notice to the Executive Secretary of such intention, withdraw from membership.

Section 9. *Termination of Membership.* For cause, any membership may be suspended or terminated. Sufficient cause for such suspension or termination of membership shall be violation of this Constitution or any agreement, rule, or practice properly adopted by the Institute, or failure to pay membership dues, or any other conduct prejudicial to the Institute. Such suspensions and terminations shall be by two-thirds vote of the entire membership of the Council, provided that, except in the case of suspension or termination for non-payment of membership dues, a statement of the charges shall have been mailed by registered post to the last recorded address of the member at least fifteen (15) days before final action is taken thereon. This statement shall be accompanied by a notice of the time and place of the meeting of the Council, at which time the charge shall be considered, and the member shall have the opportunity to appear in person, or by representative, and present any defense to such charges before action is taken thereon. Membership dues for any calendar year become due on the 1st day of that year. Any member whose dues are sixty (60) days past due shall be suspended and that member's subscription to the journal terminated. Members suspended for non-payment of dues may be reinstated at any time upon payment of the current year's dues.

ARTICLE VII

Transaction of Business

Section 1. *Management.* The management of affairs, business and concerns of the Institute shall be vested in a Council, consisting of the President, the President-elect, the most recently retired President, ten (10) elected Councilors-at-Large, and the duly elected representatives of the Regional Sections of the Institute, as provided herein.

Section 2. *Officers and Council.* The officers of the Institute shall be a President, a President-elect, a Treasurer, and an Executive Secretary. The President-elect and the ten Councilors-at-Large shall be elected as provided herein. The Treasurer and the Executive Secretary shall be appointed annually by the Council and shall be eligible for reappointment at the discretion of the Council. Elected officers and Councilors-at-Large shall not be eligible for re-election until the next election following the expiration of their term of office, except as provided in Article VIII, Section 4. The President-elect shall be elected annually for a term of one (1) year, following which term the President-elect shall succeed to the office of President for a term of one (1) year. Five (5) Councilors-at-Large shall be elected annually for a term of two (2) years. The terms of office of elected officers and Councilors-at-Large shall start at the close of the annual meeting of the Institute following the election, or in the absence of an annual meeting, then at the close of the annual meeting of the Council held in lieu thereof. They shall serve until their successors have been duly elected and installed.

Section 3. *Regional Section Representatives.* Each Regional Section shall be authorized to elect one (1) Councilor plus one (1) additional Councilor for each one hundred (100) members in excess of one hundred (100) members accredited to that Regional Section. Regional Section Councilors shall be considered elected to the Council of the Institute upon certification of such choice by the Secretary of the authorized Regional Section to the President and the Executive Secretary of the Institute. Only members residing within the prescribed area of a Regional Section shall be counted in determining Regional Section representation on the Council.

Section 4. *Meeting of the Council.* The regular annual meeting of the Council shall be held, without other notice than this Section of the Constitution, at the same time and place as the annual meeting of the members of the Institute.

Section 5. *Special Meetings of the Council.* The President may, when he deems it necessary, or the Executive Secretary shall, at the request in writing of ten (10) members of the Council, issue a call for a special meeting of the Council, and only fifteen (15) days notice shall be required for such special meeting. In lieu of a special meeting the President may, from time to time, direct the Executive Secretary to submit to the Council questions to be decided by mail vote. Twenty (20) days after the mailing of such a question the Executive Secretary will transmit to the President the replies received from the members of the Council. Two-thirds of the Council shall constitute a quorum for such Council action.

Section 6. *Quorum.* At all meetings of the Council, a majority of the members of the Council shall constitute a quorum for the transaction of business; but less than a quorum may adjourn such meeting from time to time, without further notice, until a quorum is present, except as otherwise provided in this Constitution. Any action taken at a meeting of the Council at which a quorum is present, by a majority of the members of the Council constituting such quorum, shall be deemed to be the action of the Council, except in matters requiring a majority of the entire Council, or a prescribed percentage of the entire Council.

Section 7. *Executive Committee.* There shall be an Executive Committee of the Council, consisting of the President, the President-elect, the most recently retired President, and five (5) members elected by the Council from among its own members, by such procedure as it may prescribe. The Executive Committee shall exercise for and on behalf of the Council all of the functions the Council may authorize by resolution. Five (5) members of the Executive Committee shall constitute a quorum for the transaction of business.

Section 8. *Council Vote.* Only elected or otherwise qualified members of the Council shall vote on questions brought before the Council. Officers or agents appointed by the Council and other persons invited by the Council may participate at Council meetings but shall have no vote.

ARTICLE VIII

Nomination and Election of Officers and Councilors-at-Large

Section 1. *Nomination of Officers and Councilors-at-Large.* The nominees for officers and Councilors-at-Large shall be selected by the Committee on Nominations. Not less than two nor more than three nominees shall be selected for each position to be filled. The selections will be made and certified to the Executive Secretary and the President at least four (4) months prior to the annual meeting of the Institute. Prior to certifying the results to the Executive Secretary and the President, the Chairman of the Nominating Committee will submit to each member of the Committee a tabulation of the voting showing how each member voted. These tabulations will be signed by each member and accompany the certification of the selections made to the Executive Secretary, who will retain them until the end of the next annual meeting, after which they may be destroyed.

Section 2. *Election of Officers and Councilors-at-Large.* At least three (3) months prior to the annual meeting the Executive Secretary shall mail to each member entitled to vote, a printed copy of an election ballot, carrying the names of the nominees selected by the Committee on Nominations. Accompanying the ballots shall be brief biographical sketches of the candidates, together with a mailing envelope and an inner envelope. Each member shall vote for only one (1) candidate to fill each vacancy. The marked ballots shall be placed in the inner envelopes and sealed. Neither the ballot nor the inner

envelope shall be signed or otherwise identified by the voter. The inner envelope will then be placed in a second envelope, on which the voting member will inscribe his name and address in the space provided thereon. Election ballots to be considered must be received by the Executive Secretary not later than forty-five (45) days after original mailing by him. The Executive Secretary shall then verify the eligibility of the voter, remove the sealed ballots from the outer envelopes, and forward the sealed ballots of eligible voters to a Committee consisting of not less than three (3) nor more than five (5) tellers who shall have been appointed by the President. The tellers shall count the ballots, tabulate the results, and transmit certified copies of the tabulation to the President and Executive Secretary not less than thirty (30) days prior to the annual meeting. In the event of a tie between two or more candidates the results will be decided by a majority vote of the Council at the annual meeting. The President shall announce the results of the election in the next succeeding issue of the Journal and in person or by proxy at the annual meeting.

Section 3. *Eligibility of Candidates.* It is the responsibility of the Executive Secretary to insure that all persons whose names appear upon an election ballot are eligible under the provisions of this Constitution to hold the office for which they are candidates. In any case where the name of an ineligible person is submitted the Executive Secretary will call upon the Committee on Nominations to furnish the name of an eligible person.

Section 4. *Vacancies.* Any vacancy occurring in any elective office or among Councilors-at-Large shall, until the next annual election, be filled by the Council. Any person so elected to office or as Councilor-at-Large may be a candidate to succeed himself at the next annual election.

ARTICLE IX

Meetings

Section 1. *Annual Meetings.* The annual meeting of the members of the Institute for the presentation of papers and the transaction of business shall be held at such time and place as may be designated by the Council. Notice of the time and place of such annual meeting shall be served by the Executive Secretary on each member of the Institute by mail or by publication in the journal of the Institute not less than ten (10) nor more than forty (40) days prior to the meeting. If mailed the notice shall be addressed to each member at his or her address as it appears on the membership records of the Institute. Should the Council decide that unusual conditions make it inadvisable to hold an annual meeting of the members of the Institute, then a meeting of the Council shall be held in lieu thereof.

Section 2. *Special Meetings.* Special Meetings of the Institute may be held at such time and place as may be designated in the notice of the meeting, and may be called at any time by a two-thirds vote of the entire membership of the Council. Notice of time, place and purpose of every special meeting shall be served by the Secretary by mail upon each member of the Institute not less than ten (10) nor more than forty (40) days prior to the meeting. The notice shall be addressed to each member at his or her address as it appears on the membership records of the Institute.

Section 3. *Quorum.* At each annual or special meeting of the Institute there shall be present at least five percent (5%) of the members entitled to vote, either in person or by proxy, in order to constitute a quorum for the transaction of business; but less than a quorum may adjourn such meeting until such time as a quorum is present.

ARTICLE X

Fiscal Procedure

The fiscal year of th Institute shall be fixed by the Council. The Council shall prepare an annual budget to be submitted to the members of the Institute or published in the journal at least thirty (30) days prior to each annual meeting. Funds to meet this budget may be provided by members' dues or otherwise.

ARTICLE XI

Committees

Section 1. *Finance Committee.* The President-elect shall appoint a Finance Committee. The Finance Committee shall have such powers and duties as shall be assigned to it by resolution of the Council. The President of the Institute shall be an ex-officio member of the Finance Committee.

Section 2. *Committee on Qualifications.* The President-elect shall appoint a Committee on Qualifications. This Committee shall examine the applications of candidates for membership and accept or reject such applications. The Committee shall also determine the class of membership for which an applicant is accepted. The determinations of the Committee shall be subject to review by the Council at any time.

Section 3. *Committee on Programs.* The President-elect shall appoint a Committee on Programs. This Committee shall prepare the programs for the annual meeting. The President and the President-elect shall be ex-officio members of this committee.

Section 4. *Committee on Regional Sections.* The President-elect shall appoint a Committee on Regional Sections. This committee shall have authority to recommend the chartering of additional sections and fix the boundaries between sections. The action of this committee shall be subject to review by the Council at its next regular or special meeting.

Section 5. *Committee on Nominations.* The President-elect shall appoint a Committee on Nominations, consisting of the Chairmen of all active Regional Sections and five (5) members at large. The President-elect shall designate one member of the Committee as Chairman.

Section 6. *Other Committees.* The President or the President-elect may appoint such other committees as may be deemed desirable. Each committee shall have such duties as shall be assigned to it.

Section 7. *Committees Appointed by President-Elect.* All Committees appointed by the President-elect shall serve during his term as President, except that the Committee on Programs may also function during his term as President-elect for the purpose of formulating plans for the ensuing year.

ARTICLE XII

Officers

Section 1. *Officers.* The Institute shall have as Executive Officers a President, a President-elect, a Treasurer, an Executive Secretary, and such other officers as the Council may determine.

Section 2. *President.* The President shall preside at all meetings of the Institute, the Council, and the Executive Committee. He shall have power to call meetings of the Council and the Executive Committee. He shall perform other duties and exercise other powers as the Council shall from time to time delegate to him.

Section 3. *President-Elect.* In the absence of the President the President-elect shall perform all the duties and shall have all the powers normally conferred upon the President. During his term as President-elect he shall organize his committees and formulate plans for his term as President. The President-elect shall present to the Council at its annual meeting immediately preceding his induction into the office of President, a list of names of the individuals who are to serve on the various committees required under the provisions of this Constitution. He shall perform such other duties and shall have such other authority as the Council may from time to time assign him.

Section 4. *Treasurer.* Subject to the power and duties conferred upon him by the Council, the Treasurer shall have supervision over the funds, securities, receipts and disbursements of the Institute. He shall cause all funds received by the Institute to be deposited in the name of the Institute in such bank or

banks, trust company or trust companies, as the Council may designate. He shall cause to be entered regularly in the books of the Institute to be kept for that purpose, full and accurate account of all monies received and paid by him on account of the Institute, and he shall submit a statement of his cash account at each annual meeting of the Council, and from time to time as required by them such information relative to the funds of the Institute as may be required. He shall, in general, perform all the duties incident to the office of Treasurer, and shall perform such other duties and have such other authority as from time to time may be assigned to him by the Council.

Section 5. *Executive Secretary.* The Executive Secretary shall keep the minutes of all meetings of the Institute, the Council, and the Executive Committee thereof, in books provided for that purpose. He shall keep a roll of the members of the Institute, and such other books of record and account as the Council may direct. He shall perform such other duties as may from time to time be determined by the Council. He shall be required to give bond for the faithful performance of his duties in such form and amount as the Council may determine.

Section 6. *Subordinate Officers and Agents.* The Council may appoint other subordinate officers or agents, each of whom shall hold office for such period, have such authority, and perform such duties as the Council may from time to time determine. The Council may delegate to any officer or agent the power to appoint any subordinate officer or agent and prescribe his respective authority and duty.

Section 7. *Compensation.* The employees or agents to be compensated and the extent of the compensation of such employees or agents shall be determined by the Council, unless otherwise provided for in this Constitution.

Section 8. *Resignations.* Any officer may resign at any time by giving written notice to the President or Executive Secretary. Any such resignation shall take effect upon its being accepted by the Council.

ARTICLE XIII

Contracts, Loans, Deposits, Checks, Drafts, Etc.

Section 1. *Contracts.* Except as otherwise provided in this Constitution, the Council may authorize any officer or officers, agent or agents, to enter into contracts, to execute or draw up any instruments on behalf of the Institute, and such authority may be general or confined to specific instances.

Section 2. *Loans.* No loans shall be contracted on behalf of the Institute, and no negotiable papers other than checks, shall be issued in its name, unless and except as authorized by a majority vote of the Council.

Section 3. *Deposits.* All funds of the Institute shall be deposited from time to time to the credit of the Institute in such banks or trust companies or with such other depositories as the Council may select, or as may be selected by an officer or officers, agent or agents, of the Institute to whom such power may from time to time be designated by the Council.

Section 4. *Checks, Drafts, Etc.* All notes, drafts, acceptances, checks, endorsements, or other evidence of indebtedness shall be signed by such officers of the Institute as the Council may from time to time by resolution provide.

Section 5. *Investments.* The funds of the Institute may be invested and reinvested in such manner and for such purposes as may be lawful and authorized by resolution of the Council.

Section 6. *Disposition of Surplus Funds.* Any surplus in excess of normal operating requirements, plus a reasonable reserve to be determined by the Council, shall be used to increase man's knowledge of food technology and to provide additional educational facilities by the establishment and maintenance of scholarships and fellowships to deserving students; grants and endowments to educational institutions or scientific publications; and awards for outstanding contributions of new knowledge in the field of food technology. This shall be done under such rules and regulations as the Council may prescribe; provided that no preference or discrimination shall be made therein because of the race or religious creed of any individual or individuals.

ARTICLE XIV

Limitation of Liability

Notwithstanding anything to the contrary contained in this Constitution, no agreement, contract, or obligation (other than a check), involving the payment of money or the credit or liability of the Institute for more than One Thousand Dollars ($1,000.00) shall be made without the approval of the Council.

ARTICLE XV

Subsidiary Organizations

Section 1. *Regional Sections.* The Council shall grant authority in the form of a charter to organizations of members of the Institute living in the same geographical region, for the establishment of a Regional Section, when such organization shall have complied with the conditions set forth in the By-Laws of the Institute.

Section 2. *Regional Section Associates.* Persons not qualified for membership in the Institute, but who have an interest in food technology, may be admitted to associate membership in a Regional Section, provided that the total number of such associate members does not exceed twenty-five percent (25%) of the total membership of that Regional Section. Associate members shall not be counted in determining the representation of a Regional Section on the Council of the Institute.

Section 3. *Membership in Regional Sections.* Membership in a Regional Section shall be entirely voluntary on the part of members of the Institute. A member may or may not belong to the Regional Section wherein he resides, or any other Regional Section, or may belong to two or more Regional Sections, as he chooses. In no case shall any member be counted more than once in determining Regional Section representation on the Council.

Section 4. *Dissolution of Regional Sections.* When any Regional Section shall cease to function as a Section of the Institute for a period of more than one year, or shall hold less than three meetings in any one year, or if its membership shall be less than twenty-five (25) members of the Institute for a period of one year, the Council may terminate the charter of such Regional Section. Such dissolution of a Regional Section shall not affect the membership standing in the Institute of the members of that Section.

Section 5. *Student Chapters.* The Council may grant authority in the form of a certificate to organizations of Student Members of the Institute attending any one educational institution for the establishment of a Student Chapter when the organization has met the conditions set forth in the By-Laws of the Institute.

ARTICLE XVI

Amendments

All or any part of the Constitution of the Institute, now or hereafter adopted, shall be subject to amendment, alteration, or repeal, or a new Constitution may be adopted by a majority vote of the members voting in the manner prescribed herein. Amendments, alterations, or repeal of any part of the Constitution or the adoption of a new Constitution may be proposed by a two-thirds majority vote of the Council or a majority vote of two or more Regional Sections approved by a majority vote of the Council. When thus proposed the Executive Secretary shall submit the question by mail to the members entitled to vote. Thirty (30) days after mailing, the ballots received shall be counted in the manner prescribed in Article VIII, Section 2, for the election of officers and Councilors-at-Large.

ARTICLE XVII

Dissolution

Section 1. *Voluntary Dissolution.* In the event dissolution of the Institute appears desirable, the Council shall adopt a resolution recommending the dissolution of the Institute, together with a plan of distribution, and direct that the question of such

dissolution and plan of distribution be submitted to the voting members of the Institute. The Executive Secretary or his office shall send a copy of such resolution by mail to each voting member not less than thirty (30) days nor more than forty (40) days before the date the ballots are to be counted. The ballots shall be counted in the manner prescribed in Article VIII, Section 2, for the election of officers and Councilors-at-Large. The resolutions to dissolve the Institute and to adopt a plan of distribution will each become effective upon approval of two-thirds of the members voting.

Section 2. *Distribution of Assets.* Upon the dissolution of the Institute the assets shall be applied and distributed first to the final payment and discharge of all liabilities and obligations of the Institute. Any assets held upon condition requiring return, transfer, or conveyance upon the dissolution of the Institute shall be distributed in accordance with such requirements. Any remaining assets shall be distributed pursuant to the plan of distribution adopted, to such similar associations as may be designated therein.

ARTICLE XVIII

Waiver of Notice

Any person entitled to any notice required to be given under the provisions of the General Not-for-Profit Corporation Act or under the provisions of the articles of incorporation or this Constitution, may sign a waiver thereof in writing which shall be deemed equivalent to the giving of such notice.

ARTICLE XIX

Informal Action by Members

Any action required to be taken at a meeting of the members may be taken without a meeting if a consent in writing, setting forth the action so taken, shall be signed by all of the members entitled to vote with respect to the subject matter thereof.

ARTICLE XX

By-Laws

The Council may by a majority vote adopt a set of By-Laws for carrying out the provisions of this Constitution, and may from time to time amend, alter, or repeal such By-Laws.

Book Review

LEBENSMITTELTECHNOLOGIE: Rudolf Heiss. 338 pp. + index, with 223 text-illustrations. J. F. Bergmann, Munich (1950). Price 27.60 DM (paper cover); 29.70 DM (cloth).

The subtitle to Dr. Heiss's book reads: "Einführung in die Verfahrenstechnik der Lebensmittelverarbeitung." ("Introduction to the methods of food technology.") The author modestly refers to it as a sketch (Abriss) to complement his earlier work, "Anleitung zur Lagerung von Lebensmitteln." ([Guide to] "The storage of foods.")

Five motives are listed for the assembling of the material on which it is based: rehabilitation of factories, orientation on power consumption to ensure adequate coal or electricity, orientation on the nutritional value and improvement of byproducts, to determine whether Germany lags in the industrial application of developments made possible by research, and finally in the general improvement of management.

The material is organized under four heads: I. Technical primary processes: subdivision and pressing, mixing, separation; various technological processes: sterilization, ion-exchange, etc., and industrial materials, i.e., containers. II. Production processes, predominantly mechanical. As examples, milling of cereals, preparation of margarine, chocolate, pressing of oil seeds, manufacture of starches, milk, butter, pectin, gelatine may be cited to indicate the scope. III. Production processes, predominantly thermal in nature. These include drying, roasting (coffee-ersatz!), evaporation, sterilization, freezing, crystallization, rendering (of fats), hydrolyses (starch to glucose, artificial honey, etc.). IV. Biochemical technology, including such diverse aspects as yeast extract, wood sugar, sauerkraut, brewing, wine, bakery malt and cheese products.

The foregoing is encompassed in 337 pages of text. A reviewer is necessarily in a quandary at this stage. Compression is obviously great. Thus wine, including sparkling wines, fruit and berry wines, is treated in 6 pages. The principles of drying are discussed, for the most part descriptively, except for the Stephan diffusion law, in 10½ pages. The treatment does not follow the pattern of a chemical engineering text such as Walker-Lewis-McAdams'.

Thus, while the material may have been gathered for such purposes as "Orientierung über den Energieverbrauch," it cannot be said to be reflected very clearly in the text.

Dr. Heiss appreciates that developments in the United States are based on the rapid adoption of technical and scientific advances. It is therefore regrettable that so much of our recent literature has clearly been unavailable to him. This is particularly evident in some sections, e.g., ion-exchange, dried eggs, though it should be added that these are extreme cases.

As it stands, the book will necessarily have limited appeal in the United States. As more of the literature becomes available and can be incorporated into the text of subsequent editions, it may well serve as an introductory text to the field. Notwithstanding these limitations, this book is evidence of the vitality of thought in what, five years ago, was a war-shattered country.

G. MACKINNEY.

News of the Institute

(Continued from page 12 preceding technical papers)

Present assumption of responsibilities and performance of duties by an increasing number of the young members of the Section gives reasonable assurance that the history of the Chicago Section is still definitely in the making and that the Chicago Section will continue to grow in size and accomplishments as the Institute grows.

Thank you.

Regional Section News

NORTHERN CALIFORNIA SECTION

The August meeting was held on the 17th at El Jardin Restaurant in San Francisco. The speaker was Dr. B. N. Dickinson, Director of Research, Chemical Process Co. of Redwood City. His subject: "Ion Exchange Resins: A New Tool for the Food Technologist." Dr. Dickinson received his Ph.D. from Cal. Tech., and since about the beginning of World War II has been concerned with the field of ion exchange, undertaking research on the use of resins as catalysts and oxygen adsorbents. His most recent work has been spent as director of technical selling and field service for Chemical Process Co.

About 70 members and guests attended the meeting.

OHIO VALLEY SECTION

The fall meeting of the Ohio Valley Institute of Food Technology will be held in Dayton, Ohio, October 14. The Frigidaire Division of General Motors will be the host. The theme of the meeting will be "Refrigeration from the Cradle to the Grave." Dan McCoy, former councilor for the Ohio Valley section is in charge of the program. Tours through Plants 1 and 2 will be included.

PERSONNEL

JOHN E. BREKKE, formerly at the Western Regional Research Laboratory of the Bureau of Agricultural and Industrial Chemistry at Albany, California, has been transferred to the Bureau's Fruit and Vegetable Products Laboratory at Pullman, Washington.

G. HARVEY BENHAM, formerly associate professor of biochemistry at Illinois Institute of Technology, has been named supervisor of biochemistry at Armour Research Foundation of the Illinois Institute of Technology. A native of Great Britain and a naturalized U. S. citizen, Dr. Benham received his doctorate in 1938 from the University of London, England.

DAVID JORYSCH, technical director of the flavor division of H. Kohnstamm & Co., Inc., New York City, recently returned from a trip to Vienna, Austria, where he received the Doctor of Science Degree from Vienna Polytechnic Institute.

CHARLES G. KING, Scientific Director of the Nutrition Foundation and Professor of Chemistry, Columbia University, received the honorary degree of Doctor of Science from the State College of Washington at their spring commencement exercises in recognition of his research and teaching in the field of chemistry.

SHERMAN LEONARD, previously with Schuckl, has become associated with St. Claire Packing Co., Inc., of San Jose, California.

HERMAN PHAFF has gone to Europe on a six months' Sabbatical leave from the University of California at Berkeley.

ROBERT H. STEINER has been appointed Research Coordinator of the Atlas Mineral Products Co., Mertztown, Pennsylvania. Dr. Steiner received his doctorate from the University of Pittsburgh and has been employed by the Firestone Tire and Rubber Co. for the past seven years.

LEONORA (HOHL) and ERWIN STROHMAIER announce the birth of a daughter, Louise Ann; weight, 8 pounds 4½ ounces.

PAUL KOLACHOV of Joseph E. Seagram & Sons, Inc., is in Brazil to attend the Fifth International Congress of Microbiologists. He is also scheduled to speak before the Brazilian Chemical Society in Rio de Janeiro and before another group in São Paulo. Later on he will address the Mexican Chemical Society and Chemical Engineers in Mexico City and the Academy of Science of Argentine at the University of Buenos Aires. Busy fellow, isn't he?

KEN WILDER has taken over the Directorship of the Schuckl Laboratory.

NECROLOGY

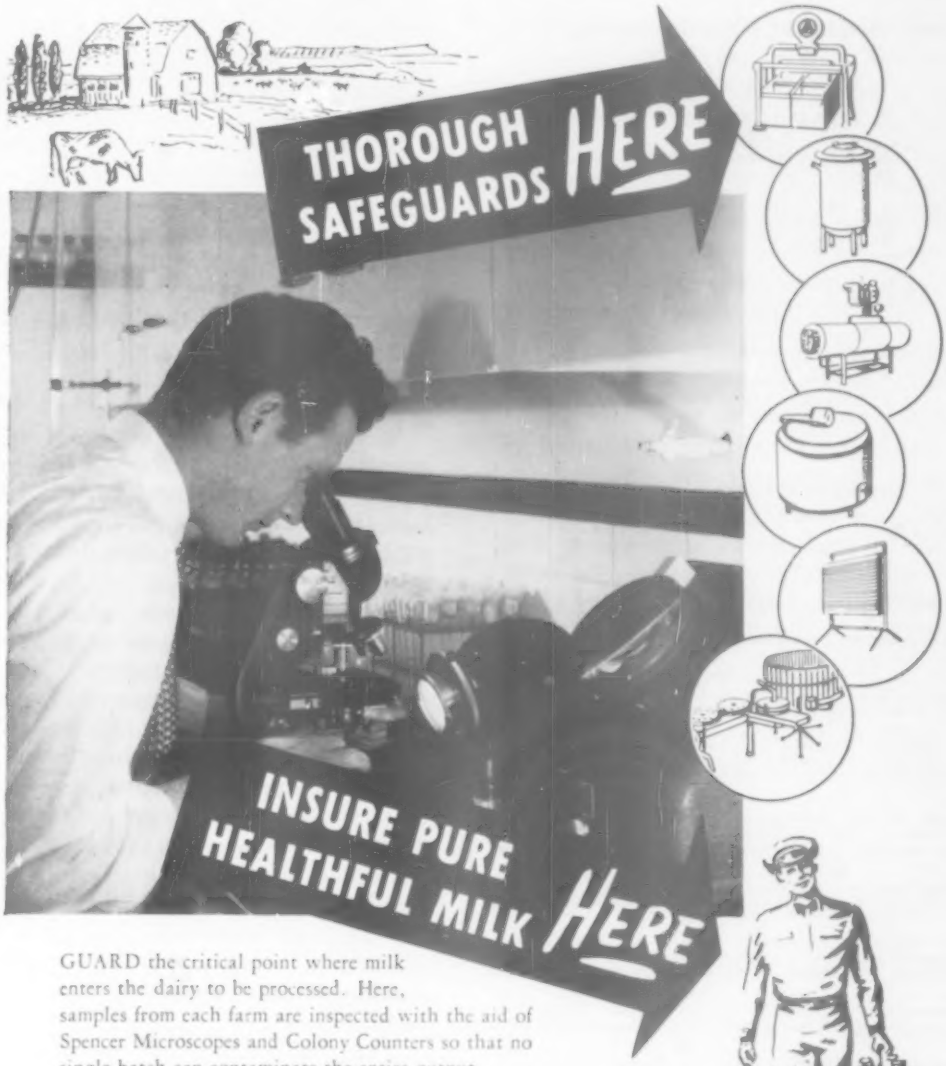
WILLIAM C. BAINBRIDGE of Kohnstamm & Co., Inc., died on July 6th after a long illness. He was 67 years old. He is survived by his wife and one daughter.

Mr. Bainbridge received his Bachelor's Degree from Polytechnic Institute of Brooklyn in 1906 where he later was an instructor in Chemical Engineering. In 1906 he joined the Kohnstamm organization, the first producers of certified colors. While with Kohnstamm, Mr. Bainbridge did outstanding work in color chemistry and research, and was largely responsible for the development of certified colors. It was his technical skill and energetic supervision that resulted in the certification of harmless food colors by the Federal Government ending an era of unsafe coloring matter in foodstuffs.

Mr. Bainbridge was the author of many scientific papers; he was a mamber of Sigma Xi, Phi Lambda Upsilon, Professional Engineers, New York Academy of Science, American Chemical Society, Fellow, American Institute of Chemists, member American Institute of Chemical Engineers, American Society of Testing Materials, and American Association of Textile Colorists and Chemists. He was a referee of the Association of Official Agricultural Chemists.

HARRY P. BOWRA, manager of the Boston Branch of Fritzsche Bros., Inc., died on June 26th. He was 37 years old. Mr. Bowra was born in Toronto, Canada, and following his graduation from the Ontario College of Pharmacy he entered the employ of Fritzsche Bros.

(Continued on page 22)



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Membership

Write to nearest regional secretary, if within an area covered by a regional section, or to the Executive Secretary of the Institute, for an application form and information regarding qualifications and classifications.

Regional Section News

(Continued from page 20)

of Canada, Ltd., in their Toronto office. In 1948 he was made manager of the Boston Branch of the company. Mr. Bowra was elected to the office of Regional Section Councilor of the Northeast Section of the Institute in 1950.

BYRON LESLIE died suddenly on July 14th of a heart ailment. He was 49 years old. He is survived by his wife and three daughters. Mr. Leslie's work in the field of food technology was well known, and he has been employed by several food manufacturing plants on the west coast. He was a charter member of the Northern California Section of the Institute and was quite active in its formative years.

NEW RESEARCH LABORATORIES

In this land where industry lives on technical advancement and dies almost overnight when it falters in its purpose to keep abreast of technics that mean products of ever improved quality, one is accustomed to read almost monthly of the dedication of a new industrial laboratory.

During the spring just passed, two new laboratories were dedicated to work either in or allied closely with the field of food technology. Both laboratories are dedicated to the advancement of man's physical well-being. One was the new laboratory of National Dairy Co., established on the magnificent former estate of W. K. Vanderbilt at Oakdale, Long Island. These laboratories cover more than 85,000 square feet of floor space in the former 100-room Vanderbilt home and associated buildings. Their splendid equipment is designed to supplement the inspiration of their lovely surroundings in providing ideal conditions for effective research. The main building stands on a knoll overlooking a placid stream in the center of 90 beautiful acres.

These laboratories are devoted to the development of new food products or new by-products in the dairy field. Dedication was on June 2, 1950, in an impressive ceremony.

The other laboratory is not primarily a food laboratory but is none-the-less dedicated to the cause of improved health for mankind. The Winthrop-Sterling laboratories dedicated a beautiful new building and facilities in Renssalaer, New York, on May 17-18. This building, an impressive three-story brick structure, is located on spacious grounds, beautifully landscaped, on a hill overlooking a typical Hudson valley industrial scene—also ideal inspiration for industrial research workers. Antibiotics and other drugs will benefit from the activities of a large staff of scientists and technologists working in these laboratories. Dedication included two sessions of addresses on clinical and biochemical progress of the past fifty years and was closed with a banquet featured by an address by Gov. Thomas E. Dewey. Mr. Dewey described the progress that has been made by the state of New York in bringing about improved medical care of its people.

C. O. B.

WORLD STATUS OF TIN

The International Tin Study Group met in Paris during the last week in March at the Ministry for French Overseas Territories, according to a March 30 Department of State news release.

The Group examined the future position of the tin industry and the likely trends in its production and consumption under assumed conditions. It estimated that world production, which has been 161,000 long tons in 1949, would be 172,000 tons in 1950, 191,000 tons in 1951 and 199,000 tons in 1952. In these estimates it was assumed that conditions conducive to full production and also political and social stability in the main producing countries would exist; it further assumed only production from plant and equipment already in operation, under rehabilitation and under commitment.

Unrestricted consumption of tin for commercial purposes under full industrial production was estimated at 127,000 long tons in 1950, 136,000 tons in 1951 and 140,000 tons in 1952. World consumption of tin in 1949 had been 118,000 tons.

The estimates showed, therefore, that there might be an excess of production over consumption for commercial purposes of about 45,000 tons in 1950 and higher figures later. On the other hand, it appeared very likely that for some time (although the Group could not indicate for how long ahead) substantial tonnages of tin would be absorbed by the United States for strategic stockpiling purposes over and above the demand for commercial purposes.—*Commercial Fisheries Review*, May, 1950.

BOOKLET ON PROPERTIES OF REFRIGERANTS

A handy booklet, "Refrigerant Tables, Charts and Characteristics," containing the complete compilation of refrigerant properties in chart and table form has been issued by the American Society of Refrigerating Engineers, 40 West 40 Street, New York City.

This 93-page booklet is unique in that it contains in one volume tables of properties, pressure-enthalpy diagrams, and Mollier charts for all commonly used refrigerants. While the material duplicates similar data which can be assembled from several textbooks, the form of the tables has been rearranged and improved and the tabular material critically reexamined and brought up to date.

The data in the book has been reprinted from the "Fundamentals Volume" of the ASRE Data Book which was issued in 1949. The tables were compiled by Harry D. Edwards and the chapter on refrigerant characteristics was prepared by Paul B. Reed. The Data Book was edited by B. H. Jennings.

It is believed that the booklet will be particularly valuable in engineering offices and schools where ready reference to refrigerant properties is required. Copies may be obtained from ASRE headquarters, 40 W. 40 Street, New York 18, N. Y., at $1.50 the copy, bound in paper, and $2.00 the copy, bound in cloth—*Am. Soc. Refrig. Eng.* News Item, July, 1950).

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Abstracts

(Continued from page 11)

320J. Process of preparing dried coffee extract.

SCHWARZ, H. W., E. G. HELLIER, AND A. L. SCHROEDER. Assignors to National Research Corporation. 2,504,735, Apr. 18, 1950.

The process of preparing dry, soluble coffee which comprises forming a liquid coffee extract consisting essentially of water and from 30% to 60% by weight soluble coffee solids, providing an evacuated chamber which is maintained at a total pressure of not greater than 4 mm. Hg by means of a water vapor pumping system, substantially continuously introducing said extract into said chamber so as to maintain a substantially constant load on said pumping system and a substantially uniform low partial pressure of water vapor in said chamber, directing said introduced extract onto a heated surface in said chamber to form a film of said extract of a thickness between 0.005 and 0.008 inch on said surface, said surface being heated to a temperature between 150° F. and 200° F., said low pressure and the heat of said surface causing substantially immediate foaming of said film without freezing thereof, maintaining said foaming film on said heated surface under said low total pressure for not less than 4 nor more than 8 minutes without disturbing said film, thereby reducing by evaporation the moisture content of said film to not more than 4% by weight, and then removing said dried extract from said surface.

321J. Frozen food improvements.

NOYES, H. A. 2,504,869, Apr. 18, 1950.

The process of making a cooked frozen product from several food constituents comprising separately preparing and cooking the constituents in usual sized pieces and liquids, separately quick freezing one or more of the cooked prepared constituents, and then further protecting the retention of flavors and tastes of the frozen pieces previous to combining with the other constituents for quick freezing by coating said frozen constituents with a coating of ice.

322J. Means and method for rendering paperboard cartons gastight and packages so produced.

BERGSTEIN, S. 2,506,057, May 2, 1950.

A moisture, vapor and gas-tight package formed of flexible materials and comprising as elements a closed paperboard carton having side and end walls, a preformed gas-tight sleeve of flexible material secured to the blank forming said carton and surrounding peripherally the side walls of said carton and closed by an independent gas-tight seam, and spaced cap-like closure elements overlying the end walls of said carton and overlapping the ends only of said sleeve and forming a moisture, vapor, and gas-tight seal therewith, and comprising each an imperforate skin of flexible gas-proof composition bonded in a gas-tight manner peripherally of said walls to said sleeve, said sleeve serving to bridge the space between said spaced closure elements, and forming therewith a moisture, vapor, and gas-tight enclosure for said paperboard carton and its contents.

323J. Airblast quick freezing of foodstuffs.

NOYES, H. A. 2,506,099, May 2, 1950.

In an airblast quick freezing process for foodstuffs, steps comprising coating such surfaces of the containers as will contact the foodstuff while it is being frozen with a solution having a freezing temperature much lower that than of the foodstuff, filling the foodstuff units into the containers, quick freezing the foodstuff, adding heat to the outside container surfaces and dumping the frozen foodstuff out of the holding container.

NEW TABLES OF FOOD COMPOSITION

The new Handbook of Food Composition Tables, just issued by the U. S. Department of Agriculture to replace an older bulletin written in 1945, will find wide usage in the food industries.

In "COMPOSITION OF FOODS—raw, processed, prepared," the Department's Bureau of Human Nutrition and Home Economics has brought data on nutritive values up to date, included more foods, and introduced new features in an endeavor to keep pace with demands of nutritionists, dietitians, physicians, and others who calculate diets for the well and the sick.

For the first time in one of its publications, the Bureau has added to the data on foods in raw state, information about the nutritive values of frozen foods and cooked foods. Listed are 751 food items from dried almonds to brewer's yeast. Nutrients cited include three minerals and five vitamins. Foods are listed in three tables: one showing nutritive values of each item in terms of a 100-gram edible portion; the next showing values in terms of 1 pound of the food as brought into the house for eating; and a third table (a new feature) showing nutritive values of foods in terms of common household units, such as one cup.

The volume will aid the food processor and technologist to obtain preliminary information on the chemical composition of almost all foods common in the United States and will be most valuable in indicating changes which occur during processing.

Nutritionists and others who calculate diets may obtain free single copies of "Composition of foods—raw, processed, prepared," Agriculture Handbook No. 8, from the Office of Information, U. S. Dept. of Agriculture, Washington 25, D. C. Others may purchase the handbook from the Supt. of Documents, Washington 25, D. C., at 35c a copy.

MANUFACTURE OF MEAL AND OIL UTILIZES HALF OF THE FISHERIES CATCH

About 46 percent of all fishery products landed in the United States and Alaska during 1949 was utilized in the manufacture of fish meal and oil. Because fish meal and oil are used where they are not recognized as fishery by-products, the importance of the fisheries that supply this industry is little known by the public.

On the farm, fish meal is an important ingredient of poultry and hog feeds. In industry, fish oil is utilized in soap, paint, varnish, insect spray, machinery lubricants, printing ink, oil cloth and linoleum, and in industrial processes (like leather tanning and aluminum casting). Thus, meal and oil from fish are converted into products which are used daily by everyone.

The raw material is derived from two sources—whole fish caught specifically for reduction purposes and fish waste from filleting, canning, and other fisheries processing. Fully 2,250 million pounds of fish was processed by meal and oil manufacturers in 1949.

Rendering plants utilize two principal species of fish—menhaden and pilchards. The menhaden catch last year was 1,069 million pounds, while that of pilchards amounted to 640 million pounds.—*Commercial Fisheries Review*, June, 1950.

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GERMAN COMMERCIAL ELECTRICAL FISHING DEVICE

Fishery leaflet 348, "German Commercial Electrical Device" contains the details available to date on the German electrical fishing device. The inventor, a German physicist, reasoned that fish could be caught by placing two electrodes into the water and putting a varying positive voltage on one electrode. The positive voltage on this electrode (the anode) would cause the fish to point towards it. The varying electric field along the spine of the fish would cause the tail muscles to contract and relax, moving the tail and propelling the fish into a net near the anode.

The Bremerhaven equalization-fund tax (derived from taxes imposed on the German fishing industry) has assigned $14,280 to be used to finance research on electro-fishing.

This 16-page leaflet contains a report on the German commercial electrical fishing device as well as translations of the following articles concerning electrical fishing methods which were published in a German periodical: "Electric Fishing at Sea"; "Use of Electro-Physiological Effects in Ocean Fishing"; "Experiences with Electric Fishing in Inland Waters"; "Electrocution of Whales"; and "On Electrocution of Whales."

Free copies of this publication are available upon request from the Division of Information, U. S. Fish and Wildlife Service, Washington 25, D. C.

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Wanted, Food Technologist, research and quality control experience with canned foods. Experience with frozen foods desirable but not essential. Give educational background, military and professional experience, and salary expected. Reply Box 112, Institute of Food Technologists, 176 W. Adams St., Chicago 3, Illinois.

Wanted, Food Production Man, chemist or chemical engineer, with some experience in production of food products. Good possibilities for rapid advancement for young man willing to move to New Orleans. Reply Box 113, Institute of Food Technologists, 176 W. Adams St., Chicago 3, Ill.

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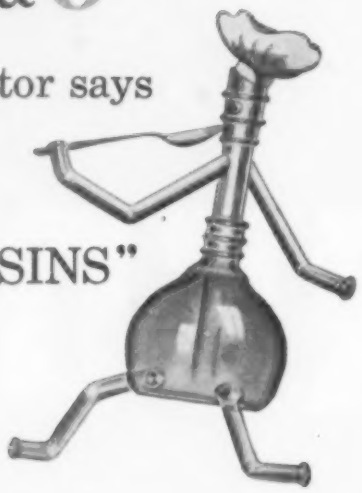

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PRELIMINARY ANNOUNCEMENT OF THE I. F. T. 1951 ANNUAL MEETING PROGRAM

The Eleventh Annual Meeting of the I. F. T. will be held at the Hotel New Yorker, June 17-20, 1951.

The general program will begin on Monday, June 18th. The papers presented will cover economics of food production, nutritional advances, consumer acceptance, and responsibilities of the food manufacturer in meeting consumer demands.

The technical program will begin on Monday, at 2. P. M. The following subjects will be considered:

Transportation of Foods
Instrumentation and Control Methods in Food Processing
Consumer Acceptance Testing
Packaging of Foods
  (a) General Problems
  (b) Tinplate and its Use in Packaged Foods
Frozen Foods
Low Temperature Evaporation of Food Products
Food Preservation
Plant Control Methods; Product Protection; Life Expectancy of the Product
Military Subsistence, etc.

Titles and abstracts should be submitted to the chairman before March 1, 1951. Abstracts should be informative, but should not exceed 250 words.

Completed papers should be submitted to the chairman before May 1, 1951.

Arrangements are being made to supply the following aids:

Projection lanterns for standard glass slides, 3¼" x 4"
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  (1) Without sound
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Each speaker, in submitting an abstract, should designate the instrument aids required. Visual aids are recommended, but should not be abused by having so much material on slides that it cannot be easily seen or read by the audience.

The papers should be concise and well organized. It is suggested authors study the instructions given by M. S. Peterson, The Quartermaster Food and Container Institute for the Armed Forces, Activities Vol. 2, No. 1 (February 1949), Anderson and Thistle, "On Writing Scientific Papers for Cereal Chemistry" (Transactions A.A.C.C., 6, No. 1, January 1948), "Suggestions for Authors" (Industrial and Engineering Chemistry), and "Suggestions for Authors" (Food Technology).

The I. F. T. will have first claim on all manuscripts for publication in FOOD TECHNOLOGY or in FOOD RESEARCH.

C. N. FREY, Chairman.

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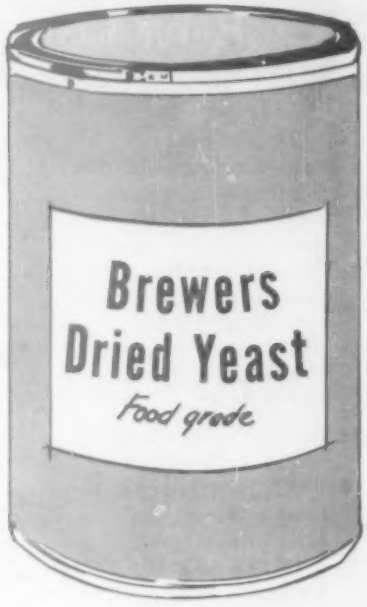

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Selected Abstracts

BIOLOGICAL SCIENCES

MICROBIOLOGY

324J. Viability of food-poisoning Staphylococci and Salmonellae in salad dressing and mayonnaise.

WETHINGTON, M. C., AND FABIAN, F. W. *Food Res., 15,* 125-34 (1950).

Acetic acid had the greatest influence on the viability of the bacteria tested. Decreasing the amount of acetic acid in either salad dressing or mayonnaise increased survival time of the organism studied. Owing to their acid content, mayonnaise and salad dressing are not probable sources of *Staphylococci* or *Salmonellae* food poisoning.

325J. Some effects of cold and freezing on microorganisms.

GUNDERSON, M. F., MCFADDEN, H. W., JR., MINTHORN, G., AND ECHANDI, R. A. *Bibl. Tech. Rep. 12,* 218, PB 98217 (1949).

Escherichia coli communic and *Salmonella pullorum* in chicken broth (pH 6.91) frozen and stored at temperatures ranging between −4 and −11° F. demonstrate a prompt initial decrease in number of microorganisms followed by a slower storage decline; however, after 24 to 28 weeks freezing storage, significant numbers of these organisms remain viable. Experimental data are given together with tables and charts. Bibliography attached.

326J. Spoilage in salad and French dressing due to yeasts.

FABIAN, F. W., AND WETHINGTON, M. C. *Food Res., 15,* 135-7 (1950).

Two samples of French and two of salad dressings, of over 100 analyzed, were found to be spoiled due to a yeast fermentation. A yeast belonging to the genus *Zygosaccharomyces* was isolated and proved to be the cause of fermentation in all cases. One case of spoilage was due to improperly cleaned and unsanitized machinery. Another was thought to be due to contaminated paprika, although this was not proved. No reason could be assigned for the source of contamination in the other two cases.

NUTRITION

327J. Self selection of diet. X. Appetites for sodium, chloride and sodium chloride.

SCOTT, E. M., VERNEY, E. L., AND MORISSEY, P. D. *J. Nutr., 41,* 173-86 (1950).

Both normal and sodium-deficient rats showed no preference for diets containing from 0.1% to 2.5% sodium chloride over low sodium diets. At lower levels, both groups preferred sodium chloride-containing diets and at higher levels both groups avoided them. An appetite for sodium bicarbonate, but not for sodium dihydrogen phosphate or sodium sulfate, was found in sodium-deficient rats.

328J. Self selection of diet. XI. Appetites for calcium, magnesium and potassium.

SCOTT, E. M., VERNEY, E. L., AND MORISSEY, P. D. *J. Nutr., 41,* 187-201 (1950).

Calcium-deficient rats, but not control animals, showed an appetite for diets containing this element. Magnesium-deficient rats, however, tended to avoid diets containing magnesium to a greater extent than did control animals. No appetite for diets containing potassium was found in potassium-deficient rats.

329J. The effect on growth of the level of manganese in the diet of rats, with some observations on the manganese-thiamine relationship.

HOLTKAMP, D. E., AND HILL, R. M. *J. Nutr., 41,* 307-16 (1950).

Seven different levels of manganese uptake have been used in an effort to establish the optimum dietary manganese level for growth in white rats. A wide range of manganese intake (0.1 to 20.0 mg. per mother rat per day) is permissible during the lactation period. After weaning, the optimum manganese intake for growth is 2 mg. per rat per day at 30 days of age and about 3.75 mg. per day at 50 days of age.

(Continued on page 6)

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Authors of papers intended for publication in FOOD TECHNOLOGY should request from the Editor's office a copy of a booklet, titled "Suggestions to Authors," and see that their papers are in the form specified therein before they are sent to the editor.

The Institute of Food Technologists assumes no responsibility for statements in contributed articles appearing in FOOD TECHNOLOGY. Editorials present only opinions of the writers and do not necessarily reflect policies of the Institute of Food Technologists.

Abstracts

(Continued from page 4)

330J. Lysine deficiency in rats. I. Studies with zein diets.
KLIGLER, D., AND KREHL, W. A. *J. Nutr., 41,* 215-29 (1950).

Zein, even when supplemented to theoretically adequate levels with the essential amino acids it does not contain, and fed in an otherwise adequate diet, does not promote optimum growth in young rats. The simultaneous addition of arginine, threonine, and valine resulted in a good though not maximum growth response. Similarly, when threonine, valine, and arginine were added together to a proteolytic digest of zein, a fair growth response was obtained. These results appear to support the hypothesis that zein is not adequately digested by the growing rat, and that consequently even when supplemented with a variety of pure amino acids, it does not support a maximum growth response, since all the amino acids essential for protein synthesis are not made available to the animal at the same time.

331J. Synthetic fatty acids as foods.
MEYER-DORING, H. H. *Klin. Wochschr., 27,* 113-16 (1949); *Chem. Abst., 44,* 4161a (1950).

The following considerations argue against the use of synthetic fats for food: (1) There is no published procedure for the determination of iso fatty acids, certain of which are definitely toxic. (2) There is no specific method for determining dibasic acids in fats. (3) The many animal experiments which have been cited do not prove the harmlessness of the fats since unsuitable experimental animals were used, the experiments were too short, and improper methods were used for studying liver or kidney damage. (4) There is an increase in excretion of dibasic acids and a strong acidity of the urine and the possibility of kidney damage in human subjects. (5) In human experiments with synthetic fats, their harmlessness was not shown since the experiments were too short and insufficient chemical methods were used. Common clinical methods were often not used. (6) The metabolism of the odd-numbered fatty acids is still not clear.

332J. The nutritive value of legume seeds. X. Effect of autoclaving and the trypsin inhibitor test for 17 species.
BORCHERS, R., AND ACKERSON, C. W. *J. Nutr., 41,* 339-45 (1950).

The seeds of 11 species of legumes were fed, raw and autoclaved, to rats as the sole source of protein at a 12% protein level. The jack bean, lentil, velvet bean, horse bean, and black-eyed pea were improved by autoclaving, while the peanut, partridge pea, guar, lespedeza, mung bean, and common vetch were not improved. No correlation was observed between the effect of autoclaving on nutritive value and the presence or absence of the trypsin inhibitor in the raw legume seed.

FOOD PRODUCTS

BAKERY PRODUCTS AND GRAINS

333J. Effect of baking pan material on heat penetration during baking and on quality of cakes made with fat.
CHARLEY, H. *Food Res., 15,* 155-68 (1950).

Effects of using baking pans made from steel, japanned iron, anodized aluminum, sheet iron, bright aluminum, tinned iron, stainless steel, copper, and glass on heat penetration during baking and on quality of cakes made with fat were studied. The steel, japanned iron, anodized aluminum, and sheet iron were significantly faster baking pans than were the bright aluminum, tinned iron, stainless steel, or copper ones. Thus, the faster-baking pans were those which were dark or dull or both. The quality and appearance of each cake produced is discussed in detail.

334J. The effects of various treatments of paddy rice on the aneurin and nicotinic acid content of the milled grain.
DONE, J. *Brit. J. Nutr., 3,* 335-45 (1949).

The effects of treatments of the parboiling type on the aneurin and nicotinic acid content of whole and milled rice were investigated. All treatments resulted in some loss of aneurin in the whole grain. Treatments brought about redistribution of aneurin and nicotinic acid in the grain so that a high proportion of these substances was conserved in the milled product. The most satisfactory product was obtained by soaking paddy rice for two hours at 80°.

MEAT AND POULTRY

335J. Processing of sausage and potted meats with particular reference to their water content.
DAHL, O. Reports of the State Institute of Public Health, Stockholm, Sweden, No. 7, 1-29 (1948) (in Swedish with English summary).

The investigation reported established a quantitative concept of the importance of certain prerequisites in order to assure that the moisture content and quality of the finished product is within desired limits. The factors considered include: uniform beef and pork assortments; standard recipes; routine water determinations on the more important and variable ingredients; adjustment of recipes with reference to such determinations; homogenization of the raw mass; standardization of casings and of all processing conditions.

336J. Fat rancidity in eviscerated poultry.
KUMMEROW, F. A., AVERY, T., VAIL, G. E., HITE, J., AND KLOXIN, J. *Bibl. Tech. Rep. 12,* 217 PB 98245 (1949).

The results obtained should make possible the procurement of poultry of predictable cold [illegible]e life through an inspection and analysis of the ration for its linolenic acid content. The ration should be linolenic acid free. Rancid fats were shown to have as much nutritive value as fresh fats. The non-acceptability is due to a lack of palatability.

SALT

337J. Salt and kraut flavor.
TUSTIN, JR., E. B. *Canning Trade, 72,* 7, July 3, 1950.

Some packers have used as little as 0.5% salt on cabbage, and under such conditions, the undesirable gram-negative bacteria and certain streptococci may develop before the normal fermentation gets well under way. The resulting kraut is then soft in texture, abnormal in flavor and often very white. With the use of an increased amount of salt—2 to 2.5%—the fermentation process takes place under the most favorable % of salt to produce a quality product. Above 2.5% on the other hand, salt retards the growth of the previously mentioned beneficial first-growing bacteria. The resulting slower production of acid and alcohol favors the development of red and pink colored yeasts and dark spots.

SANITATION

338J. Sources of insect and rodent contamination in food processing industries.
DICKE, R. J. *Pest Control, 17,* No. 10, 13-18 (1949); *Pack. Abst., 6,* 997, No. 3689 (1949).

A two-year study of the confectionery industry showed that accumulations of fragments of insects and rodents hairs throughout the plant were the principal source of contamination, although human hair, nail polish, fragments of clothing and active insect and rodent infestation were also detected. It was noted that filth contamination continued even after the elimination of active insect and rodent infestations. The method of investigation was as follows: food products were examined at all stages in the manufacturing process from their shipping in as raw materials to their final dispatch as finished packs. The manufacturing plant was examined at monthly intervals for insect and rodent faeces, insect webbing and frass, feeding marks on food products and accumulations of dead insects and cast skins. The method of examination and analysis of food residues is described and twelve illustrations of various contaminants are given. The importance of the strict implementation of simple sanitation practices by food manufacturers is mentioned.

(Continued on page 13 following technical papers)

Notes and Letters

Improvement in the Medium for Counting Flat-Sour Spores

The accepted medium for the estimation of numbers of spores of flat-sour bacteria in sugar and starch and in cannery samples is that of Williams (*Food Research* 1, 217, 1935) as described in the Methods of Analysis of the Association of Official Agricultural Chemists (6th Ed., 1945). Colonies of flat-sour bacteria are supposed to change the purple brom cresol purple indicator to yellow within and about the colony. Experience with pure cultures of flat-sour bacteria, however, has shown that not all colonies would produce this yellow halo about them in this medium.

A lowering of the buffering capacity of the medium by reduction of the tryptone content from one percent to 0.5 percent improved the medium considerably as is shown by the table. Spores from three pure cultures of flat-sour bacteria were plated in this experiment.

It will be observed that the agar with less tryptone is superior for the estimation of flat-sour spores.

TABLE 1

A comparison of the production of detectable acid by colonies of several strains of flat-sour bacteria in brom cresol purple agar media containing 1 percent and 0.5 percent tryptone, respectively

Strain	1 percent tryptone		0.5 percent tryptone	
	Ave. No. Colonies Per Plate	Percent Colonies Lacking Acid	Ave. No. Colonies Per Plate	Percent Colonies Lacking Acid
No. 1518 [a]	53	5.5	58	0.5
S 5	218	3.6	269	0.25
B 30	17	4.4	272	0.00

[a] Culture No. 1518 was obtained from the National Canners Association Research Laboratory, Washington, D. C. Culture S 5 was isolated from white cane sugar and culture B 30 from starch.

W. A. Corpe and W. C. Frazier
Department of Agricultural Bacteriology
University of Wisconsin
Madison, Wisconsin

U. S. HYBRIDS BOOST EUROPE'S CORN YIELDS

Whether or not a feed grain shortage exists in Soviet lands, farmers in the still free democracies of Western Europe are growing more corn than ever before in their long agricultural history, thanks to U. S. hybrid seed.

Hybrid corn became important to Europe when the German armies retreated from the devastated Danube basin early in 1945. Seed was rushed in by UNRRA, and the resulting crop helped save the lives of some 300,000 Europeans made homeless by the war.

Since then, a lot of U. S. hybrid seed has been planted in Western European fields. It comes from 12 corn belt states, and most of it is handled by Iowa exporters for shipment abroad. According to the Iowa Development Commission, at Des Moines, more than 400,000 bushels of hybrid seed have been exported this year. Now growing on European farms, this seed is expected to treble the yield, in some areas, of the native open-pollinated corn it has replaced.

An Italian agronomist, Professor Luigi Fenaroli, was among the first European agricultural scientists to see the potentialities of hybrid seed for his country. In 1946 he visited Iowa State College, saw what the experiment station was doing with hybrid corn, and went back to Italy to test a number of varieties on his home soil. After completing his experiments he distributed samples of the U. S. hybrid seed among 3,000 Italian farmers for planting alongside their native corn. Comparative yields were so striking that the following year, for 1949 planting, the Italian Farmers' Cooperative arranged to purchase 80,000 bushels—enough to plant 320,000 acres under intensive cultivation. This year, the Italian Co-op. contracted for 100,000 bushels.

Other European countries have similarly tested and accepted the U. S. seed. France planted 1,200 bushels in 1949, and the results were such that French farmers bought for 1950 planting all of the 48,000 bushels their government purchased, and set a rush order for 2,800 bushels more. Before the AMG bowed out of Germany it ordered 200,000 bushels of U. S. hybrid seed for this year's planting, to be sold to individual farmers. The Germans feed corn largely as fodder to dairy cattle, and like the size of the hybrid plants.

Average yield of European open-pollinated corn has been around 22 bushels an acre. U. S. hybrids have upped this figure substantially. On some fields in Italy and Greece, former yields have been trebled. Italy's crop, nationwide, is four million bushels above pre-hybrid totals, on the same acreage. In countries where corn is grown for fodder or ensilage, the American seed is out-producing native open-pollinated corn by about 40 percent.

As corn is planted in most of Europe, a bushel of seed covers about four acres, as compared with seven in the U. S. A. European farmers, whose habits are slow to change, have long been accustomed to thick planting followed by a thinning out of weak plants later. They cultivate intensively, using every available foot of ground. When corn is grown for grain the stalk is usually topped as soon as the ear is filled, and the tops are used for fodder while the ears ripen on the stalks.—(From the Corn Inds. Research Foundation's *Corn*, 6 [3], [1950].)

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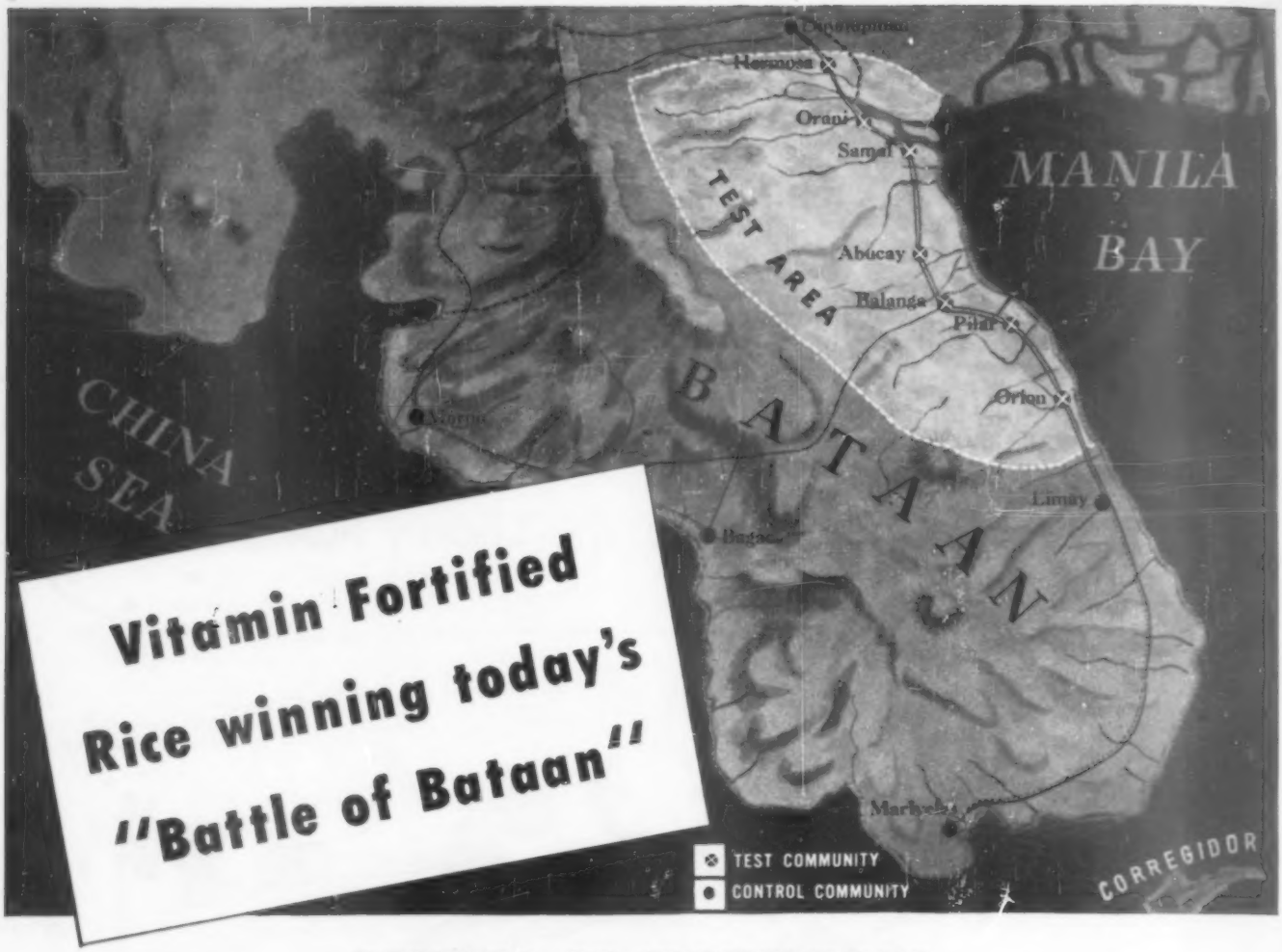

Vitamin Fortified Rice winning today's "Battle of Bataan"

RESULTS OF TREMENDOUS NUTRITIONAL EXPERIMENT USING VITAMIN ENRICHMENT

★ Symptoms of 2nd most fatal disease reduced 70%

★ Beriberi deaths steadily falling

In an experiment in the Philippines now involving over 90,000 persons, conducted with the approval of the Philippine government and medical associations, and in which Hoffmann-La Roche is proudly cooperating, remarkable health benefits from rice enrichment have been demonstrated. This is reported by Juan Salcedo, Jr., M.D., M.A., Director of Nutrition, Institute of Nutrition, Manila, P.I.

With rice the principal food, and beriberi the No. 2 cause of death, this new "Battle of Bataan" was planned and waged to determine whether enrichment of rice would reduce the incidence of beriberi. Bataan Province was selected because of its high beriberi mortality and because rice traffic could be readily controlled there. (Early investigation showed enriched rice completely satisfactory in taste, color, odor, palatability and digestibility.)

*"There are indications from raw data available from the present clinical beriberi resurvey that the beriberi incidence has been reduced by 70%."**

Beriberi mortality rates have also steadily dropped in the "enriched rice" area without significant change in the control area.

★ Infantile beriberi virtually eliminated

This dramatic and specific evidence of the benefits of vitamin enrichment should have a vital effect in improving the health of peoples all over the world.

WHAT THIS MEANS TO YOU

While these facts concern white rice, the conclusion is clear that vitamin and mineral enrichment of white bread, family white flour, macaroni, noodles, and other processed cereals is a direct and practicable way of correcting dietary inadequacies. The Bataan work confirms the judgment of nutritional experts who have advocated such enrichment, and further justifies legislation already enacted in 26 States, Puerto Rico and Hawaii requiring enrichment of all family white flour and white bread.

*Quotation from latest of published interim medical reports. *Write for reprint.*

ROCHE

VITAMINS FOR ENRICHMENT

VITAMIN DIVISION • HOFFMANN-LA ROCHE INC. • NUTLEY 10, N. J.

MEAT PRE-PACKAGING: WHERE DOES IT STAND?

Anonymous article published in *Modern Packaging* 23, 4, 86 (1949).

Abstracted by Margaret Hazeltine.

"Pre-packaging of cut fresh meats for self-service retail sale has been one of the fastest growing trends in recent years—and at the same time one of the most controversial."

The author states that customers buy more meat when they are offered a pre-packaged selection; also, that a store's volume on other items tends to rise in proportion to the extra sales attracted by the convenience of packaging. However, there have been many complaints by retailers about the difficulties encountered in packaging and preserving cut meats.

The first scientific comprehensive report of the meat pre-packaging business has been compiled by the U. S. Department of Agriculture. Sixty-five chain and 32 independent stores were used for its study. At the beginning of the survey in 1948, these comprised about 25% of all the stores doing meat pre-packaging. Material was collected by means of personal interviews with retailers doing this type of merchandising.

Both stores and customers were enthusiastic about pre-packaging. Fifty-one stores reported a steady general upward trend in pre-packaged meat sales. Twenty-seven others reported sales leveling off at a point still above the high volume established at or soon after the time this new merchandising method was started. With the exception of two, operators of the ninety-seven stores reported enthusiastic reactions by their customers.

The average pre-packaged item consisted of 1.16 pounds of fresh beef—beef made up about one-half the total tonnage—wrapped right in the retail store in cellophane on a tray and topped with a thermoplastic label. The labor cost for handling a pound of meat averaged 4.3 cents per pound for a large store, 5.4 cents for a small store, the greater use and higher cost of skilled labor in small stores being the differentiating factor.

The major problems of pre-packaging divide into three general groups; discoloration, packaging techniques and labor efficiency.

(Continued on page 18)

Increase consumer demand.... Raise flavor levels.....with

Huron **MSG**

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Huron **HVP**

HYDROLYZED VEGETABLE PROTEINS

For that perfection in food flavor which assures enthusiastic consumer acceptance and continuing demand . . . many food processors have already found Huron MSG and Huron HVP valuable aids in raising flavor levels.

Huron's specialized service is always available to suggest ways of obtaining maximum taste value consistent with economy through use of Huron MSG and HVP.

To those who have not used our service, we suggest a simple way in which you can prove the advantage of using Huron MSG and HVP. For example, in . . .

SEAFOODS:

In a multitude of foods of the sea an appropriate amount of MSG heightens the flavor and retains fresh caught goodness. Clam and fish chowders are best improved by the addition of MSG at 0.15%, while richer and more viscous products such as crab and lobster bisques require a slightly greater amount ranging up to 0.2%. Solid packs of both salmon and tuna are raised in flavor quality with use of 0.15% MSG. Canned oysters and clams, whole or minced, require only 0.1% MSG for significant flavor improvement, while lobster, crabmeat and shrimp all are benefited through the addition of 0.15% MSG. Fish pastes, because of their high flavor intensity and high salt content, require the addition of 0.25% to 0.5% MSG for maximum flavor value.

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Regional Section News

DIXIE SECTION

Processing of pimientos was featured on the program of the September meeting of the Section held at Griffin, Georgia. The fifty or more members and visitors attending departed after the meeting feeling that they had a good insight into pimiento processing in Georgia. This state produces 90 percent of the country's output.

An inspection of the plant of the Pomona Products Co. provoked many questions from the group about pimiento growing, costs, yields and marketing. Answers were given by the guest speaker: Dr. H. L. Cochran of the company. An additional highlight of the meeting was an inspection of the research facilities of the Georgia Agricultural Experiment Station, a large part of which is devoted to food research. To Messrs. Sam Cecil, J. G. Woodroof and others of the Station, go thanks for arranging a splendid program and an old-fashioned southern barbecue. The Dixie Section extends a cordial invitation to all food technologists in other parts of the country to visit with them at any of their meetings. Of course, there is not a southern barbecue in connection with all the meetings.

OHIO VALLEY SECTION

The Section met at Dayton on October 13th, the group assembling at Plant 1 of the Frigidaire Division of General Motors. The tour included the Home Economics Department and Plant 2. The next day there was an Executive Board meeting of the section in the morning and lunch (every man for himself) after the meeting. The afternoon was given over to the technical sessions at the Frigidaire Auditorium in Moraine City, seven miles south of Dayton. The following papers were given:

Opening remarks by Dr. H. D. Brown, The Ohio State University, President, Ohio Valley Section; and Program Chairman D. C. McCoy, Frigidaire Division, General Motors.

"Relation of Temperature to our Daily Lives." F. H. McCormick, Assistant Chief Engineer, Frigidaire Division, General Motors.

"Commercial and Industrial Refrigeration and Air Conditioning." R. E. Robillard, Frigidaire Division, General Motors.

"Refrigeration and Air Conditioning in the Home." R. M. Bell, Frigidaire Division, General Motors.

"Thrills of Freezing," a skit by C. E. Quigley and George Plumly, Appliance Sales Department, Frigidaire Division, General Motors.

"Frozen Poultry Products—Recent Developments." A. R. Winter, Poultry Husbandry Department, The Ohio State University.

There then followed a cocktail hour through the courtesy of Frigidaire Division of General Motors at the Velour Room of the Van Cleve Hotel. Next was the dinner also through the courtesy of the Division. After dinner, there was an interesting address by Mason M. Roberts, Vice President, General Motors Corp., and General Manager, Frigidaire Division.

PHILADELPHIA SECTION

The Section held a joint meeting with the American Association of Candy Technologists on September 27th at Drexel Institute of Technology. Ernest C. Crocker, since 1922 with Arthur D. Little Inc., Cambridge, Mass., spoke on "The Flavor Approach to Quality." Mr. Crocker is widely known for his studies on flavor and odor and with F. L. Henderson is the author of the "Crocker-Henderson Odor Classification Standards."

PERSONNEL

CHARLES H. BYRNE, Section Head, Birds Eye-Snider Laboratories, Hillsboro, Oregon, has been transferred to the Birds Eye-Snider Laboratories at Albion, N. Y.

H. C. DIEHL, Director and Secretary of the Refrigeration Research Foundation, and one of the past presidents of the Institute, has moved his office from Berkeley, California to Colorado Springs, Colorado.

DOMENIC DEFELICE, Section Head, Birds Eye-Snider Laboratories at Albion, N. Y., has been transferred to the General Foods Research and Development Department in New York City as staff technologist.

A. WRIGHT DUTCHER, formerly with the National Association of Frozen Food Packers, Washington, D. C., has been appointed plant manager in charge of canned food production of John H. Dulany and Sons, Inc., Fruitland, Maryland.

CONRAD A. ELVEHJEM, Chairman, Department of Biochemistry, and Dean of the graduate school, University of Wisconsin; and CHARLES GLENN KING, Scientific Director, The Nutrition Foundation, New York City have been appointed to the American Board of Nutrition, an organization to establish standards of qualification of persons as specialists in human nutrition.

ELLERY H. HARVEY, founder and past president of the Associates of Research Directors and former director of research at Anheuser-Busch, Inc., St. Louis, has been appointed professor of food technology at Illinois Institute of Technology. Dr. Harvey has been research chemist with Swift and Co., director of laboratories Montgomery Ward and Co., and chief chemist for Wilson and Co. He received his Ph.C. and Ph.M. (1916 and 1921) from the Philadelphia College of Pharmacy and Science; A.B. and A.M. (1923 and 1924) Bucknell University; Ph.D. (1926) University of Wisconsin; Ch.E. (1929) Bucknell, and LL.B. John Marshall Law School (1932). He was president of the Institute of Food Technologists 1946-1947. But we still think that the only men that became famous by degrees were Centigrade and Fahrenheit.

J. M. LEMON, chief of the technological section in the Branch of Commercial Fisheries, Fish and Wildlife Service since 1943, has been appointed to a new position as refrigeration specialist in that Branch. His headquarters will be at the Fish and Wildlife Service's laboratory on the campus of the University of Maryland, College Park, Maryland.

(Continued on page 17)

Abstracts

(Continued from page 8 preceding technical papers)

339J. Food contamination from the new insecticides.

DUBOIS, K. P. *J. Am. Diet. Assn., 26,* 325-8 (1950).

In the case of the chlorinated hydrocarbons such as DDT, acute poisoning from single doses is rare. However, chronic poisoning from continued ingestion of the materials is demonstrable in animals, and the stability of these agents, together with their tendency toward accumulation and storage in the tissue lipoids, places emphasis on the necessity of avoiding food contamination through the use of excessive amounts of these materials. Information regarding the possible effects of ingestion of small quantities of these agents over long periods of time must await the results of further experimentation. With organic phosphorus-containing compounds now in use, acute poisoning has been the problem of major concern. The tendency of these insecticides to undergo rapid hydrolysis to nontoxic materials in the presence of moisture makes chronic poisoning unlikely. Thus far, no evidence indicating the possibility of poisoning through food contamination by the organic phosphates used as contact insecticides has been obtained. The organic phosphates which are systemic insecticides by virtue of their ability to be absorbed by plants are more hazardous than the other organic phosphates, and it appears that these new agents should be employed with caution to prevent the possibility of accidental poisoning.

SUGARS

340J. Sugar from palm trees.

Science, N. L., 57, 372 (1950).

The addition of 0.008 oz. of sulfanilamide to a gallon of palm juice prevents fermentation of the sugar in the juice. Since palm juice contains 10% to 14% sucrose, the use of this preservative should open a valuable source of sugar to the world's supply.

PATENTS

341J. Process for producing a soluble aromatic coffee extract.

HOLZER, T. Assignor to E. Osswald. 2,511,712. June 13, 1950.

A process for producing a fully soluble aromatic coffee extract in powder form, comprising the steps of mixing 100 parts by weight of green coffee with about 20 to 30 parts by weight of a carbohydrate of the group consisting of glucose, dextrose and maltose, partially roasting said mixture, lixiviating said partially roasted product with water, concentrating the extract by evaporation and again roasting the residue of said evaporation for the purpose of further aromatizing same, the said carbohydrates having the property of not furnishing any caramelizing products in the process, which would impair the coffee aroma.

342J. Process of recovering caffein.

SHUMAN, A. C. Assignor to General Foods Corporation, 2,508,545. May 23, 1950.

A process for recovering caffein from a solution obtained by aqueous extraction of coffee which comprises extracting the aqueous extract with a water-immiscible organic caffein solvent, redissolving the solute from organic solvent solution in water, adjusting the pH of the resulting aqueous solution to a value of at least 7.0 by the addition of an alkali base, and crystallizing the caffein therefrom.

343J. Method of treating chocolate raw materials.

AASTD, K. C. S. 2,515,150. July 11, 1950.

A method for converting chocolate raw material comprising cocoa mass and sugar into a mass of plastic consistency, which comprises subjecting the raw material to a single vigorous pressure of the order of magnitude of 200 kg. per sq. cm.

344J. Shortening agent.

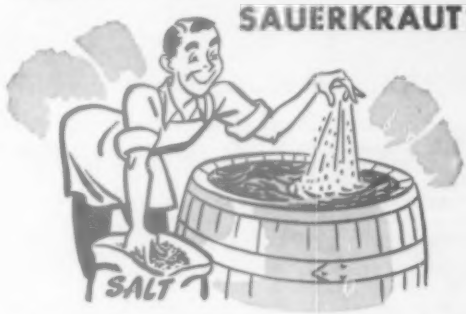
BARSKY, G. Assignor to E. F. Drew & Co. Inc. 2,509,414. May 30, 1950.

(Continued on page 14)

Bulls See RED?

Bulls are color-blind. Scientists have disproved the theory that they "see red." Famous matadors agree that when "El Toro" blows his top at sight of a waving red cape, it's the waving . . . not the red . . . that riles him.

COARSE SALT FOR SAUERKRAUT?



Another popular misconception is the belief among some makers of sauerkraut that they must use the very coarsest crystals of salt. Scientists *know* that light, bulky salt (such as Diamond Crystal's grain for the purpose) spreads more easily in the vat. This results in uniform salt distribution and much better control of sauerkraut fermentation.

DO YOU WANT FACTS?

For sauerkraut or any other "salt-minded" product, Diamond Crystal has just the right grain and grade for you. If you want facts about salt requirements for your processes, just write our Technical Director. He'll gladly recommend the correct grade and grain of Diamond Crystal Salt for best results. Diamond Crystal, Department N-11, St. Clair, Michigan.

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Write to nearest regional secretary, if within an area covered by a regional section, or to the Executive Secretary of the Institute, for an application form and information regarding qualifications and classifications.

Abstracts

(Continued from page 13)

A shortening agent comprising a glyceride oil having shortening properties, and the reaction products of mono- and diglycerides of higher fatty acids of vegetable and animal oils with a water soluble acid having the general formula—$R(OH)_a(COOH)_a$—wherein R represents hydrocarbon groups having from 1 to 5 carbon atoms, and a is 1 or 2, the OH groups of the glycerine radical being substantially fully esterified.

345J. Stabilized oleaginous materials.

BUXTON, L. O., AND DRYDEN, C. E. Assignors to Nopco Chemical Company. 2,511,427. June 13, 1950.

A process for the stabilization of fatty materials which comprises admixing a relatively small quantity of a phosphatide with a fatty material, heating the mixture in contact with ammonia, and subsequently removing from the mixture the free ammonia which is admixed therewith, the ammonia combined with fatty acids in the mixture and any water which is present in the mixture, said removal of the ammonia and the ammonia and the water being accomplished by heating the mixture under reduced pressure until the ammonium soaps therein are split into free ammonia and free fatty acids, and the ammonia is removed from the mixture leaving the free fatty acids in the mixture.

346J. Antioxidants.

BUXTON, L. O., AND DRYDEN, C. E. Assignors to Nopco Chemical Company. 2,511,428. June 13, 1950.

A process for enhancing the antioxidant activity of a phosphatide which comprises heating in contact with ammonia a mixture of a phosphatide and a volatile organic solvent in which the phosphatide is at least partially soluble, said solvent having a boiling point of at least about 40° C., the heating being carried out at about the reflux temperature of the solvent, and thereafter removing from the phosphatide the free ammonia admixed therewith, the ammonia combined with the fatty acids in the phosphatide, the volatile organic solvent and any water which is present in the mixture, said removal of the ammonia, the water and the solvent being accomplished by heating the phosphatide under reduced pressure until the ammonium soaps therein are split into free ammonia and free fatty acids and the ammonia is removed from the phosphatide leaving the free fatty acids in the phosphatide.

347J. Synergistic antioxidant.

HALL, L. A. Assignor to The Griffith Laboratories, Inc. 2,511,802. June 13, 1950.

An antioxidant composition comprising an organic acid of the class consisting of benzoic, fumaric, tartaric and citric, and an ester of the class consisting of low molecular weight alkyl esters of gallic acid and ascorbyl esters, the proportion of the acid being 3 to 50% of the total of the acid and ester being 97 to 50% of the total of the acid and ester, and in which the total of the respective proportions are such as to give a synergistic effect in said antioxidant composition.

348J. Antioxidant flakes.

HALL, L. A. Assignor to The Griffith Laboratories, Inc. 2,511,803. June 13, 1950.

An antioxidant composition comprising from 99.97 to 98.55% by weight of a solid hydrogenated fat in the form of flakes having dissolved therein from 0.015 to 0.70% of an antioxidant acid of the class consisting of benzoic, fumaric, tartaric, phosphoric, ascorbic and citric acids and from 0.015 to 0.75% of a gallic ester of the class consisting of methyl, ethyl, propyl, butyl, hexyl and lauryl gallates.

349J. Antioxidant salt.

HALL, L. A., AND SAIR, L. Assignors to The Griffith Laboratories, Inc. 2,511,804. June 13, 1950.

An antioxidant composition comprising about 0.015 to 0.35% by weight of an antioxidant acid of the class consisting of benzoic, fumaric, tartaric, phosphoric, ascorbic and citric

Abstracts

acids, about 0.015 to 0.35% of a gallic ester of the class consisting of methyl, ethyl, propyl, butyl, hexyl and lauryl gallates, and about 0.070 to 0.30% of a non-toxic polyhydric alcohol associated with a carrier for the antioxidant comprising table salt, proportions being by weight of the composition including the table salt.

350J. Process of preventing rancidity of cooking fats.

DOOLIN, E. B. 2,514,479. July 11, 1950.

The process of storing used cooking fats which have been heated to cooking temperatures to prevent rancidity and prevent peroxides of more than 12.0 from forming in the fats during periods of non-use, which includes the steps of heating the fats to a temperature of at least 330° F., placing the fats into a container capable of being made air-tight and completely filling the container with the fats while the temperature of the same is at least 330° F. to thereby displace all air from the container, sealing the container to make the same air-tight, and thereafter permitting the fats to cool and contract to form a vacuum in the container and storing the cooled fats in such condition until they are ready for re-use.

351J. Process for stabilizing edible fatty oil.

LINDSEY, JR., F. A., AND MAXWELL, W. T. Assignors to The Southern Cotton Oil Company. 2,513,948. July 4, 1950.

The process of stabilizing an edible fatty oil which comprises adding thereto a small proportion of substantially isolated citric acid and heating the mixture to within a range of 120 to 190 degrees centigrade and continuing the heating for the time required, varying with the pressure and with the temperature within such range, to break down a substantial part of the citric acid into aconitic acid and aconitic anhydride acid and arresting the process before the formation of more than a minor proportion of aconitic anhydride relative to the proportion of the aconitic acid and aconitic anhydride.

352J. Mineral pellets.

ZELLERS, M. W. 2,512,537. June 20, 1950.

In the production of animal and poultry feeds of the vitamin-mineral-protein and weather-resistant type, wherein the mineral content comprises from 25% to 80% by weight of the content of the feed, and wherein the feed is produced for service in the form of pellets and tablets acceptable palatably under voluntary feeding conditions, the method of producing the feed to render the mineral content palatable to animal stock and poultry, said method consisting in admixing the selected ingredients within an agitator and in accord with a predetermined order as follows: Initially present the mineral content in ground form and agitate, then add the vitamin elements including liquid yeast, then adding a dried molasses content and the protein content, and finally adding additional liquid yeast to form a semi-crumby mass, all the while maintaining agitation, then subjecting the mass to a blending operation in presence of steam under approximately ten pounds pressure, and then forming the pellets and tablets by compression thereby to provide complete equable distribution of the ingredients throughout the pellet and tablet to present these in a form adapted for administration to the animal and fowl by the voluntary "licking" activities of the animal and the voluntary "pecking" activities of the fowl with the equable distribution of the prepared content such as to assure the voluntary acceptance as to palatability by the animal and fowl.

353J. Animal food manufacture.

HAUGH, R. R. Assignor to Kraft Foods Company. 2,508,112. May 16, 1950.

The process of making an animal feed material which comprises making a mixture of the desired food ingredients containing on the dry basis, 15 to 70% lactose and the remainder including protein feed materials, adjusting the moisture content of the mixture to a point where the mixture contains from about 10 to 30% water thereby producing a plastic mass, extruding the mixture under heavy pressure, and sub-dividing the extruded material into pellets.

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NATIONAL SCIENTIFIC REGISTER

The Following Is of Vital Importance to Every Food Technologist. Do Not Turn This Page Without Reading Every Word of It.

At the request of the National Research Council and the Federal Security Agency, The Institute of Food Technologists is participating in compiling the NATIONAL SCIENTIFIC REGISTER. In order to acquaint our members with this project, the following release by the Federal Security Agency, Office of Education, Washington, D. C., is quoted:

Within the next few months, approximately 150,000 American scientists and technologists will be asked to participate in one of the most comprehensive registrations of scientific personnel yet attempted by the Government. Final plans have been completed for this operation by the National Scientific Register, sponsored by the National Security Resources Board, and administered by the Office of Education, Federal Security Agency. The registration will include qualified scientists in the natural and physical sciences, and will be accomplished through the direct assistance of the principal professional and scientific societies. The purpose of the registration is to provide urgently needed information on the country's supply of technological personnel in the many scientific fields—information needed for both immediate and long-range mobilization planning.

The need for an analytical index of American scientists became apparent to the NSRB when lack of specific information began seriously to hamper efforts to prepare complete and comprehensive mobilization plans. Provision has been made for such a register in legislation creating the National Science Foundation. However, because of the international situation early in 1950, the NSRB decided that this important function could not be delayed longer, and that some interim action should be taken pending the creating of the NSF. Accordingly, the National Scientific Register was established in the Office of Education in the summer of 1950. James C. O'Brien of the Office of Manpower, National Security Resources Board, who formerly headed the wartime National Roster of Scientific and Specialized Personnel, was named Director of the new enterprise.

The National Scientific Register was given the responsibility for providing answers to two pressing questions in the over-all manpower problem: (1) What are the characteristics of the supply of scientific and technological manpower in the country? and (2) What will be the requirements for scientists and technologists in all phases of mobilization?

It appeared that the only practical method of obtaining answers to the first of these questions was to effect a registration of scientists by means of questionnaires designed to obtain the specific types of information required. The whole project is a voluntary one with the scientists themselves cooperating with the Government to make the enterprise a success. Committees of leading scientists in each of the fields to be covered were consulted and an effort was made to develop specialty check lists which would serve as the basis for all of the various types of studies required.

The scientific fields to be included in the present registration are as follows: physics, chemistry, the biological sciences, geology, geophysics, meteorology, astronomy, mathematics, and crystallography. Registration will not be made in the engineering fields at this time since the recent study of American engineers, sponsored by the Office of Naval Research and completed under the direction of the Engineers Joint Council, has been made a part of the National Scientific Register. When registrations in the fields of science just named have been completed, it is anticipated that a follow-up study will be made in the fields of engineering to complete the coverage.

The problem of ascertaining and projecting requirements for scientific personnel is more difficult and research studies are being set up to determine the best means of obtaining required data and coordinating efforts of the various governmental agencies in attacking the over-all problem.

Information obtained through circularization of scientists will be analyzed and interpreted by a special coding group, and the results will be recorded in an electronic punch card system. A survey was made of the various newly developed techniques for the mechanical recording, tabulating, and interpreting of such data, and the Register has adopted several new devices which should result in the most advanced system of personnel registration developed.

The National Scientific Register project has been given a high priority by the NSRB in view of the critical role played by American science in the last war, and in recognition of the fact that American security and supremacy in a future war will depend to an important degree on the total utilization of scientific and technological skills. For this reason, it is considered important that every scientist who is circularized in the current registration, return his questionnaire as quickly as possible. Important statistical studies need to be undertaken at an early date, and the comprehensiveness of data included in these studies will be an important factor in the total mobilization planning effort of the Government. While the National Scientific Register at present does not envision a large-scale placement function, data obtained from individual scientists will be recorded in such a manner that the system will lend itself to whatever type of placement or distribution program might be required in an all-out mobilization effort, should one occur.

The Institute of Food Technologists has accepted responsibility for the registration of scientific and technological personnel in the field of FOOD TECHNOLOGY. This applies not only to members of the Institute, but to all scientific and technological personnel in our field.

Registration consists of completing a check list questionnaire, placing it in a franked reply envelope, and dropping it in the nearest mail box. The questionnaire has been simplified as far as possible consistent with obtaining the essential information, and can be filled out by anyone in about 15 minutes. Certain minimum qualifications for those to be registered have been established for the various groups. The minimum qualifications for registration in the field of Food Technology will be those for Professional Members in the Institute. (For these qualifications see Article VI, Section 2, Institute Constitution, published in October FOOD TECHNOLOGY.)

Present plans call for registration of Chemists and Chemical Engineers through the American Chemical Society, Physicists through the Institute of Physics, and Engineers through the Engineers Joint Council. Questionnaires for some of the other groups will be distributed prior to distribution of Food Technology questionnaires. Therefore, many members of the Institute will receive questionnaires from other sources, due to membership in those societies. If the individual desires to register in the broader field of Food Technology, rather than in a specific science field, he may disregard the other questionnaire and await the arrival of the Food Technology questionnaire.

It is desired to point out that the present registration is entirely voluntary. However, should we become involved in a major emergency there is little doubt that registration will become compulsory. The supply of scientific and technological manpower in the United States is so limited that the most effective use of this group is of major importance. It is felt that in order to secure maximum effective utilization of scientists and technologists, it will be necessary that their registration and utilization be handled by some group other than the War Manpower Board or Selective Service. The use of the National Scientific Register which is being set up by the Federal Security Agency will be by qualified scientists, capable of evaluating needs for scientific personnel and passing on the qualifications of individuals, rather than by laymen.

It will be of considerable assistance if members will bring to the attention of their fellow scientists and technologists who meet the minimum qualifications, but who are not members of the Institute, the importance of this registration, and request them to simply place their name and address on a penny post card and mail to the Executive Secretary of the Institute. This will insure those individuals receiving a questionnaire. The Institute is asking various industrial associations in our field to lend assistance in compiling lists of scientists and technologists within their groups. We hope to begin mailing questionnaires within the next four or five weeks.

In view of the enormous load of clerical work involved in this registration, it will be impossible for my office to reply to individual inquiries concerning registration.

CHARLES S. LAWRENCE
Executive Secretary
176 W. Adams Street
Chicago 3, Illinois

News of the Institute

(Continued from page 12)

DONALD A. MORGAN, formerly located at the Weslaco, Texas fruit and vegetable laboratory of the Bureau of Industrial and Engineering Chemistry, U. S. Department of Agriculture, has been transferred to the Winter Haven, Florida laboratory of that Bureau as chemical engineer.

ROGER H. LUECK, formerly manager of sales for the Pacific Division of the American Can Co. has been appointed general manager of research of the Company with headquarters in New York City. Dr. Lueck is a graduate of Carroll College and received his M.S. from Wisconsin, and in 1943 an honorary D.Sc. from Carroll College. And did you see Roger's picture recently on the financial page of the *New York Times?*

ALBERT H. NAGEL, associate chemist, Birds Eye-Snider laboratories at Albion, New York, has been transferred to the Hillsboro, Oregon laboratories as Section Head.

JOHN H. NAIR, assistant director of research for Thomas J. Lipton Inc., Hoboken, N. J., who is also chairman of the American Chemical Society's 75th Anniversary Committee appears on the cover of the September 4th issue of *Chemical and Engineering News.* Read all about John on page 3046 of this issue of *Chemical and Engineering News.*

WILLIAM L. RAINEY, formerly chief chemist for Commander-Larabee Milling Co., Minneapolis, has been promoted to vice-president and technical director of that company.

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Meat Pre-Packaging: Where Does It Stand?

(Continued from page 11)

Discoloration was the chief complaint. It is actually the principal factor in determining the life of the pre-packaged meat in display cases. Over half of the departments reported their customers highly critical of color and "bloom" in pre-packaged meats. Ninety-five percent of the departments also reported that customers discriminated against meat that naturally cuts dark.

All stores have been trying hard to reduce discoloration. Some techniques used before wrapping were: plattering before wrapping, using oxygenic paper and allowing a blooming period. After wrapping, 90 of the 97 stores were turning packages face down, keeping the meat well refrigerated, and placing packages on display only as needed. Actual spoilage did not prove much of a problem; 78 of the 97 stores reported it amounted to less than 1% of sales.

All films used in wrapping were criticized. Foremost of the complaints were: lack of visibility, does not seal readily, breaks or crumbles frequently, and fails to prevent discoloration.

The stores reported it would take considerable equipment to handle a large volume of pre-packaged meat. Most of them, however, were getting by on the minimum of equipment. One of the indispensables was an attractive refrigerated display case. —*Commercial Fisheries Abstracts*, April, 1950.

EMPLOYMENT NOTICES

Wanted, Food Technologist with food training at college level and schooled in techniques of baking and cooking, to run tests on effect of various inhibitors in baked and cooked foods. Salary dependent upon experience and qualifications. Southeastern location. Give full details in first letter and a photograph. Excellent opportunity for advancement. Reply Box 114, Institute of Food Technologists, 176 W. Adams St., Chicago 3, Ill.

Wanted, Food Chemist, M.S. or Ph.D. or equivalent experience in food chemistry. Work involves research in development of new chemicals for use in food industries. Southeastern Location. Give full details in first letter and a photograph. Excellent opportunity for advancement. Reply Box 115, Institute of Food Technologists, 176 W. Adams St., Chicago 3, Ill.

Position wanted, graduate Food Technologist, eleven years varied experience in canning, freezing, preserves, pickles, government inspection, desires position in East in technical sales and service, consulting, or research and product development. Reply Box 116, Institute of Food Technologists, 176 W. Adams St., Chicago, Illinois.

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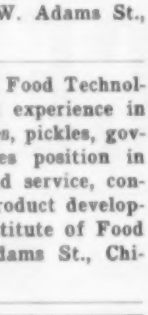

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REFRIGERATION IN BREADMAKING

Information relating to temperature, humidity, air movement, and apparatus to obtain desired results in breadmaking within the refrigeration range is presented in the latest Application Data Section issued by the American Society of Refrigerating Engineers.

Methods of applying refrigeration to the storage of ingredients, accessories, and wrapping machines are considered along with dough mixer and ingredient water cooling, and air conditioning for fermentation rooms and bread coolers. Besides being profusely illustrated, the six-page pamphlet contains tables giving typical equipment specifications used in the industry and the range of temperature and humidity for a fermenting room.

"Refrigeration in Breadmaking," was written by W. J. Hoffman, president of the Arctic Engineering Company Inc., New York City. Copies may be obtained from ASRE headquarters, 40 West 40 Street, New York 18, N. Y., at 40c each. (Am. Soc. Refrig. Eng., News Item, July, 1950).

Holiday Specialties are TASTIER when Flavored by *FRITZSCHE*

Some food manufacturers are beginning to wonder why the promotion and sale of fruit cakes, mince meat and plum puddings should be limited almost exclusively to the seasons of Thanksgiving and Christmas, when surely, these delectables are just as tasty in May, June or July. Many of these same manufacturers are *insuring a larger market* for their specialties by making them extra palatable with FRITZSCHE'S Imitation Rum, Brandy and Mince Meat Flavorings. For details, write:

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5 to 2

people preferred his corned beef hash WITH AC'CENT!

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A sample of the test batch and a sample of his regular run were sent to 171 families.

With the 592 individuals who stated a preference, the hash *with* Ac'cent was preferred 5 to 2!

The result of this test, on file in our offices, is another of the many proofs that Ac'cent is a discovery that merits investigation by every processor of food. For never before has it been possible to heighten the flavor of food by so simple, so inexpensive an additive.

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SPISORESINS, the result of six years of research and development in the D&O Laboratories, are now offered to food manufacturers seeking the best flavoring ingredients. SPISORESINS are special extractions of dry spices and contain all of the flavoring qualities that are in the spices themselves, and are not to be confused with essential oils.

SPISORESINS of all important spices such as Allspice, Cinnamon, Clove, Garlic, Nutmeg, Onion, Black Pepper and Sage are available. The Dodge & Olcott Laboratories have also developed sixty SPISORESINS MIXTURES including every important flavor used in the meat processing industry. Bologna, Braunschweiger, Deviled Ham, Liverwurst, Turkey Loaf and Salami illustrate the complete flavor range of SPISORESINS.

SPISORESINS, in addition to being paramount flavors, are easy to use. SPISORESINS are even-spreading of uniform strength, properly balanced and are free from the bacteria, molds and yeast spores frequently found in dry spices.

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Book Review

CANNED FOODS IN HUMAN NUTRITION. E. J. Cameron and J. Russel Esty, Editors. National Canners Association, Washinton, D. C., 1950, 264 pages, many tables and illustrations.

The purpose of this attractive booklet is to provide a convenient and authoritative reference source on the nutritive values of commercially canned foods, their proper handling and preparation for use by the ultimate consumer, and their practical applications in meeting the optimum requirements of human nutrition.

The volume includes sections on "Modern concepts of nutrition," "Nutritive value of canned foods" and on "Storage and utilization of canned foods" followed by an appendix of eleven tables giving the proximate composition, nutrient content etc. of foods.

This booklet will be a valuable reference source for all those concerned with processed foods and nutrition, whether from the production or research angles. It will also aid teachers of food technology, home economics, nutrition and of many other subjects. The fine index and bibliography add greatly to the usefulness of this volume. (ZIK).

INTRODUCTION TO THE BACTERIA. By C. E. Clifton. McGraw-Hill Book Company, 1950. (528 pages). Price $5.00.

The factors influencing the death and survival of bacteria, such as temperature variations, disinfectants, antibiotics and other practical methods of destruction are discussed in detail in this book which also contains several good chapters on the bacteriology of soil, water, and air; the preparation and preservation of food; industrial microbiology; infectious diseases, and infection and resistance.

This text is not necessarily recommended to the student or technologist desiring to refer to it with the intention of practical application. Although the author describes the general staining properties of bacteria, the book is not a manual of laboratory practices. The descriptions of methods of staining and of systematic study, as for instance the Bergey system of identification, are not entirely adequate. However, this is not a serious criticism of a book designated as an "Introduction," especially since many other texts are available on techniques and classification.

This is a good text for the person desiring a general knowledge in the science of bacteriology. The book is simple in presentation, yet theoretical enough to afford an interpretation of the basic aspects. It furnishes the reader with an adequate understanding of the origin of bacteria, their structure, morphology, habitats and growth requirements. These subjects are well illuminated with a wealth of illustrations and photomicrographs of bacteria, yeasts and molds.

ALFRED RUMMINGER.

Nutrition in NEW Streamlined Packages...

Special yeasts, rich in protein and high in vitamin content, are now going to manufacturers of Baby Foods, Cereal products, Foods and Pharmaceuticals in new streamlined packages recently perfected at Anheuser-Busch.

The packages shown here are 100 and 200-pound containers which provide complete protection to the nutritional products produced by the Dried Yeast & Derivatives Department of Anheuser-Busch.

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Regional Section News

NORTHEAST SECTION

The Section met on October 5th at Patten Restaurant, Boston, Mass., for cocktails, dinner, a business meeting and an address. Major Grant Healy, Dept. of the Army, Office of the Quartermaster General, Washington, D. C., addressed the group on "Industrial Mobilization Planning for Military Food Requirements."

Officers and Committee memberships for 1950-1951 are as follows:

Chairman: Newton R. Cole, Walter Baker Co., Dorchester, Mass.

Vice Chairman: Michelle P. Vucassovich, Gorton-Pew Fisheries Co. Ltd., Gloucester, Mass.

Secretary: Charles H. Shackelford, Great A. and P. Tea Co., Boston.

Treasurer: Loren B. Sjostrom, Arthur D. Little Co., Inc., Cambridge.

National Councillors: Ernest C. Peakes, New England Confectionery Co., Cambridge; W. B. Esselin, Jr., University of Massachusetts, Amherst.

Executive Committee: Robert S. Harris, Department Food Technology, Massachusetts Institute of Technology, Cambridge; John M. Milne, Dorothy Muriel's Inc. Allston Station, Boston.

Committee Chairmen:

Hospitality: Jean F. Caul, Arthur D. Little Co., Inc., Cambridge.

Nominating: Dean Samuel C. Prescott, Massachusetts Institute of Technology, Cambridge.

Program: Michelle P. Vucassovich (Vice Chairman).

Budget: Loren B. Sjostrom (Treasurer).

Auditing: Mason T. Rogers, Dewey and Almy Chemical Co., Cambridge.

Membership: Samuel A. Goldblith, Department of Food Technology, Massachusetts Institute of Technology, Cambridge.

Publicity: Richard D. Martin, 9 Rockaway Avenue, Marblehead.

Employment: Lyle M. Richardson, 164 Broadway, Cambridge.

Professor B. E. Proctor was elected by the Executive Board to chair a committee for establishment of the Samuel Cate Prescott Award, annual award to be given by the Northeast Section for recognition in food technology. The nature of the award, qualifications of recipients, time and place of presentation are now under consideration.

PUGET SOUND SECTION

The October meeting was held on the 19th at The Chalet in Seattle. Speaker for the evening was Dr. Charles R. Stumbo, Associate Professor of Horticulture, Washington State College, Pullman. His subject: "Evaluation of Temperature Effects on the Sterilization of Foods." Dr. Stumbo received his doctorate from Kansas State University in 1941 and has accomplished outstanding research on problems relating to thermal microbiology in the field of food processing. Prior to coming with Washington State he was chief of the bacteriological section, Food Machinery and Chemical Corp., San Jose, California.

SOUTHERN CALIFORNIA SECTION

Dr. Clinton H. Thienes, Professor of Pharmacology and Toxicology, University Southern California Medical School, addressed the Section at their September meeting. Dr. Thienes spoke on "Food Poisoning Due to Chemical Contamination." In connection with work in this field, Dr. Thienes was in favor of an initiative on the Los Angeles ballot which will make it possible for medical research laboratories to obtain animals from the city pound for experimental purposes. It is quite possible that Dr. Thienes is not very popular with the antivivisectionists.

A symposium on carotene featured the October meeting. Professor L. Zechmeister of California Institute of Technology acted as chairman of the panel. Dr. Harold M. Barnett, Barnett Laboratories, Long Beach, California discussed the extraction of carotene from carrots; Samuel M. Greenberg, University of Southern California Biochemistry Department spoke on the use of carotene in the coloring of margarine.

Officers for the coming year were installed at the September meeting:

Chairman: F. L. Hart, Food and Drug Administration, Los Angeles District, Los Angeles.

Chairman-elect: H. J. Deuel, Jr., University Southern California School of Medicine, Los Angeles.

Secretary-Treasurer: M. G. Morehouse, University Southern California Medical School.

Assistant Secretary-Treasurer: G. L. Merchant, Merck and Co., Inc., Los Angeles.

Executive Committee: F. H. Hunicker, Continental Can Co., Los Angeles; P. J. Rich, Mission Dry Corp., Los Angeles; J. B. Pardieck, California Vegetable Concentrates, Inc., Huntington Park, California; J. S. Lawless, Frosted Fruit Products, Los Angeles; L. B. Rockland, Bureau Agricultural and Industrial Chemistry, U. S. Department of Agriculture, Pasadena.

Section Councillors: M. S. Dunn, University California, Los Angeles; A. N. Prater, Gentry Inc., Los Angeles; M. S. Burns, Mardon S. Burns and Associates, Los Angeles; R. E. Cox, Bireley's Division, General Foods Corp., Hollywood, California.

GREAT LAKES SECTION

The Fall meeting was held on November 10th at the Battle Creek Country Club, Battle Creek, Michigan. Afternoon papers were:

"Quality Control in the Breakfast Cereal Industry." Jack Trout, Head Quality Control Department, Kellogg Co., Battle Creek.

"Quartermaster Cereals and Baked Products Problems." Theodore Soloski, Chief, Cereal and Baked Products Division, Food Laboratories, Quartermaster Food and Container Institute for the Armed Forces, Chicago, Ill.

(Continued on page 14 following technical papers)

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Selected Abstracts

BIOLOGICAL SCIENCES

MICROBIOLOGY

354J. A comparative study of known food-poisoning staphylococci and related varieties.

EVANS, J. B., AND NIVEN, JR., C. F. *J. Bact., 59,* 545-50 (1950).

A physiological study conducted on 114 strains of staphylococci, including 22 strains that were known to produce enterotoxin, showed that the enterotoxigenic strains comprised an extremely homogeneous group. Most, if not all, enterotoxigenic staphylococci are members of the coagulase-positive group, but they do not preclude the possibility that some coagulase-negative staphylococci might also be associated with food poisoning.

355J. Numbers, kinds, and source of molds in flour.

CHRISTENSEN, C. M., AND COHEN, M. *Cereal Chem., 27,* 178-85 (1950).

The mold counts of approximately five hundred samples of flour, collected principally in commercial mills, ranged from several hundred to more than 5,000 per g. Three samples of washed wheat from one mill, collected as the wheat went to the first break rolls, contained only a few hundred molds per g., while the flours milled from these wheats contained up to several thousand molds per g. Flour collected from the interior of spouts, roll housings and other mill machinery bore from several thousand to several million molds per g., of the same species as were commonly encountered in commercial flours. The chief source of mold contamination of flour appears to be molds growing and sporulating within the milling system itself. The predominant molds in most of the flours were *Aspergillus glaucus* and *A. candidus.* Unidentified species of *Penicillium* made up a major portion of the mold flora in only a few samples of commercial flour. Several other genera were found in most samples, but only in small numbers.

FOOD PRODUCTS

BEVERAGES

356J. Is frozen milk concentrate next? Part II.

Quick Frozen Foods, 12, 51-3, May, 1950.

Discussion of two main technological obstacles remaining to be overcome in the development of a marketable frozen concentrated milk. (1) protein instability, (2) oxidation.

357J. Treatment and disposal of waste waters from processing of coffee.

BRANDON, T. W. *East African Agric. Jour., 14* (4), 179-86 (1949); *Biol. Abst., 24,* 1159, No. 11925 (1950).

Mixed waste waters produced during processing of coffee are equivalent in polluting character to about 60,000 gallons of crude domestic sewage for each ton of clean coffee produced. About 85% of the total polluting matter is produced during pulping, and 15% during washing of the fermented beans. Laboratory experiments indicate that the polluting character of the mixed waste waters can be greatly reduced by natural fermentation. Experiments suggest that the most satisfactory method of treatment would be by biological filtration.

CHEMICAL ADDITIVES

358J. Chemicals introduced in the processing of foods.

BING, F. C. *Am. J. Public Health, 40,* 156-64 (1950).

A review article of the legal and public health aspects of 'chemical' food additives. Certain specific compounds are discussed in the fields of vitamins, minerals, salt substitutes, preservatives, emulsifiers, and flour bleaching agents. The author suggests amendment of the food and drug law to assure adequate testing of proposed additives.

EGGS

359J. The pasteurization of liquid egg.

Food Manuf., 25, 283-6 (1950).

Bacteria contamination in the commercial handling of liquid egg is a serious problem which cannot be eliminated entirely by sanitary measures. A commercial pasteurization operation is now being used in England. Temperature used is 140-145° C., holding time 3 minutes. These conditions give efficient pasteurization without any coagulation.

FISH AND FISH PRODUCTS

360J. A new improved salt herring curing method.

Die Fisch-Woche, 4, No. 37, 542 (1949) (in German); *World Fish Abst., 1,* 41, Mar.-Apr. (1950).

A new patented German method of curing salt herring, which claims to overcome the poor eating qualities of the traditional salt herring, has been developed. The fish have almost the appearance of fresh herring; they are full, and the flesh is tender, only mildly salted, fat, with pleasant flavor and odor and resembling Maatjes-herring. The cured fish contain about 10% salt against 17% for ordinary pickled herring, and they can be consumed after a short soaking in water. The fish, sold at present under the trade names of 'Drei Anker' and 'Polarstern' by two licensed producers, are cured in ten days, instead of the seven to eight weeks curing of ordinary pickled herring. The curing is done without objectionable preservatives. It is planned to equip the herring fishing boats so that the curing process can be started aboard.

361J. Progress in the production of fish sausages.

REUTER, H. *Die Fisch-Woche, 4,* No. 26, 365 (1949) (in German); *World Fish Abst., 1,* 27, Mar.-Apr. 1950.

Fish sausages packed in tins have been introduced to facilitate their storage and marketing. Ten-liter (610 cu. in.) tins of black plate, holding 36 pairs of sausages in a clear brine, have been used. The single sausage is 10 cm. (4 in.) long, 2.6 cm. (1 in.) in diameter, and weighs about 82 g. (about 3 oz.). Examination shows the sausages to smell and taste strongly of smoke and spices, and thus no fishy odor or flavor is noticeable. The pH of 6.0 suggests that an organic acid, such as tartaric acid, is used to retard bacterial growth. Incubation of the tins for five days at 37° C. (93.6° F.) showed no swelling of the tins. After removal from the tins the sausages retained, at room temperature, their palatability for three days, although they lost 10% in weight; after four days they began to smell fishy and were unpalatable at seven days. The keeping quality can be increased by storage in brine, or at lower temperatures.

362J. Increasing the keeping quality of fresh fish held in ice.

HEISS, R. *Die Fisch-Woche, 4,* No. 33, 474 (1949); (in German); *World Fish Abst., 1,* 31, Mar.-Apr. (1950).

Subjectively judged changes in freshness are compared with chemical and bacteriological tests. The effects of these bacteria on fish spoilage at ice temperatures are discussed. Emphasis is placed on the importance of keeping the temperature of the fish as close to 0° C. (32° F.) as possible from the time the fish are caught until processed. The usefulness of the trimethylamine test as a routine test for freshness is reported. The recommendations of the United Kingdom Department of Scientific and Industrial Research for the proper handling and storage of fish are listed and discussed in detail. Improvements in vessel construction in order to lower the temperature of the fish cargo (insulated and jacketed fish holds) are described.

PECTINS—JAMS AND JELLIES

363J. Jellies produced from steam condensate from apple blancher.

DAVIS, L. L. *Proc. Amer. Soc. Hort. Sci., 53,* 193-6 (1949); *Biol. Abst., 24,* 578, No. 5980 (1950).

(Continued on page 8)

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Authors of papers intended for publication in FOOD TECHNOLOGY should request from the Editor's office a copy of a booklet, titled "Suggestions to Authors," and see that their papers are in the form specified therein before they are sent to the editor.

The Institute of Food Technologists assumes no responsibility for statements in contributed articles appearing in FOOD TECHNOLOGY. Editorials present only opinions of the writers and do not necessarily reflect policies of the Institute of Food Technologists.

Abstracts

(Continued from page 6)

Good quality jellies were produced from the condensate obtained from the discharge line of a commercial steam blancher, in a frozen apple line, while the varieties York Imperial, Stayman Winesap, Albermarle Pippin, and Black Twig apple slices were successively blanched. These original condensates varied, depending upon the variety, from a pH 3.2 to 3.7 and in degrees Brix of 4.0 to 5.0. When the condensate was concentrated to approximately one-third of its original volume, the pH tended to be higher, especially with the variety Albermarle Pippin, possibly by a loss of volatile acids. When the condensates were made into a 65° Brix sugar jelly (a) without concentration, (b) concentration to two-thirds of original volume, and (c) concentration to one-third of original volume, a good flavored apple jelly, clear and of variable color, ranging from light tint of yellow with Albermarle Pippin, to pink and deep red, depending upon the redness of the variety, well flavored, good quality jellies, developed. It is believed that jelly superior to that of 'cider jelly' can be made by utilizing the condensate from steam-blanching lines in frozen apple processing, and that such jelly would find much appeal to the commercial trade. At the present time, such jellies would have to be labeled as 'spreads' pending a possible change in the definition of standards of the Pure Food and Drug Administration.

364J. Confirming the formation of pectin gels in the cold.
DEUEL, H., AND EGGENBERGER, W. *Kolloid-Z., 117,* 97-102, May, 1950 (in German).

Gels have been made in the cold way, and the effect of standing at various low temperatures studied. Intermediate temperatures of around 25° C. produced the firmest gels. Higher or lower temperatures produced less firm gels. Additional studies have been made varying the esterification of the pectin, the sugar and acid concentrates.

PATENTS

BAKERY PRODUCTS

365J. Process of retarding stiffening of bread.
JOHNSTON, N. F. 2,509,926, May 30, 1950.

In the preparation of yeast-raised bakery products, the method of decreasing rate of staling which comprises mixing into the dough a small amount of a material selected from the group consisting of reaction products of a polyhydroxy compound and an alkylene oxide which have been partially esterified with a straight chain monocarboxylic acid having at least 12 carbon atoms and reactions products of an alkylene oxide and a partial ester of a polyhydroxy compound and a straight-chain mono-carboxylic acid having at least 12 carbon atoms.

366J. Process of retarding stiffening of bread.
JOHNSTON, N. F. 2,509,927, May 30, 1950.

In the preparation of starch-containing, yeast-raised bakery products, the improvement which comprises incorporating a polyoxyethylene monoester of a higher fatty acid in the dry mix in an amount approximately 0.1 to 3.5% by weight of the flour where the ester contains a molar ratio of ethylene oxide radicals to fatty acid in the range of 6:1 to 16:1.

CEREALS AND GRAINS

367J. Method of sterilizing corn products.
BALL, C. O. Assignor to The United Products Company, 2,502,197, Mar. 28, 1950.

The process of sterilizing a corn product containing 30 to 65% of corn kernels selected from the class consisting of whole corn kernels and parts of whole corn kernels and the remainder a sauce containing 8 to 90% of finely divided corn grains in added water, said process comprising sterilizing said product in a container while said added water contains not more than 35% of its weight of said finely divided corn grains, and while said corn kernels and the remainder of said finely divided corn grains are substantially stratified in layers.

368J. Tapioca process.
OLSEN, A. G. Assignor to General Foods Corporation, 2,508,533, May 23, 1950.

The process of producing granular products from starch of the group consisting of tapioca and waxy starches for use in the preparation of puddings which comprises gelatinizing, drying and comminuting the starch into particles small enough to pass a 14-mesh screen, adding water to a mass of such particles and stirring the mass to cause the particles to unite into agglomerates, substantially less than the weight of the starch, the amount of water being to avoid substantial swelling of the particles but being distributed on the surfaces of the particles to cause surface stickiness whereby porous agglomerates are formed, and then drying the porous agglomerates.

369J. Process of producing flour.
BROWN, D. H. 2,509,418, May 30, 1950.

The process of producing germ flour from wheat berries having germ, aleurone and endosperm portions and an outer bran layer which comprises selecting berries which have been aged at least ninety days out of the field, tempering the berries from four to six hours with water and maintaining the temperature of the berries at 60° to 80° F. during the tempering, passing the berries through a plurality of break and reduction rolls of which the break rolls have been separated sufficiently to pass the germ in its normal form and of which the reduction rolls have been separated sufficiently to reduce the germ, aleurone and endosperm to flour fineness, and maintaining the berries at a temperature below approximately 85° F. from a time at least subsequent to tempering and prior to the delivery of the berries to the first break rolls and until the process is terminated and including aeration of the berries during passage thereof through the break and reduction rolls.

370J. Production of bran-containing food products.
RAYMER, M. M., AND THOMPSON, J. J. Assignors to Kellogg Co. 2,509,449, May 30, 1950.

The method of treating bran in the preparation of food products therefrom which comprises cooking the bran in admixture with barley malt sprouts separated from the grain. A ready-to-eat breakfast cereal type wheat bran food product of palatable character composed of wheat bran in admixture with a minor proportion of dried barley malt sprouts separated from the grain.

371J. Process for aging flour.
SILVER, M. L. 2,510,146, June 6, 1950.

The method of treating finely comminuted cereal products for effecting aging thereof, which comprises intimately contacting the product to be treated to a gaseous chloramine-containing atmosphere selected from the group consisting of monochloramine and dichloramine and any mixtures thereof.

372J. Separation of the starch and gluten constituents of flour.
HARRELL, C. G., HAIGH, J. T., AND BROWN, R. O. Assignors to Pillsbury Mills, Inc. 2,516,117, July 25, 1950.

The process of separating gluten from wheat flour which consists in adding from one-fourth percent to three and one-half percent by weight sodium thiosulfate to the flour, mixing the flour to which the sodium thiosulfate has been added with a quantity of water sufficient to form a dough but not in excess of that required to form a batter, thereafter washing the preparation with a large quantity of water while agitating the same and removing the wash water containing the starch from the gluten.

COFFEE

373J. Methylation of xanthine to form caffeine.
DECKER, W. E. Assignor to Technical Specialties Company. 2,509,084, May 23, 1950.

A process for the synthesis of caffeine which comprises converting guanine to xanthine by treatment with hydrochloric acid, and then, in the same reaction vessel and without recovering the xanthine from the resulting solution, neutralizing the excess acid to bring the pH of the solution to 6.5 to 7.0, methylating the xanthine in the resulting solution with acetone

(Continued on page 10)

Some use Christmas bells...

Some use Christmas holly...

Some use a fat Santa Claus,
Round, red, and jolly...

But our wish takes all of them,
See? They're all here –
To say...

MERRY CHRISTMAS!

And a BRIGHT GOOD next year!

Norda ESSENTIAL OIL AND CHEMICAL COMPANY, INC., 601 West 26th Street, New York 1, N. Y.

CHICAGO • LOS ANGELES • ST. PAUL • MONTREAL • TORONTO • HAVANA • MEXICO CITY • LONDON • PARIS

Abstracts

(Continued from page 8)

and methyl acetate, priming the resulting caffeine solution with a compound selected from the group consisting of methyl oxalate and caffeine, and separating caffeine from the solution by crystallization.

374J. Coffee extraction process.

ORNFELT, J. Assignor, by mesne assignments, to American Home Foods, Inc. 2,515,730, July 18, 1950.

In a coffee extraction process in which ground roasted coffee is extracted in a series of stages with water at an elevated temperature in the range of 125°-150° C. to produce a highly concentrated coffee extract, the further step of using said extract in the approximate temperature range 25°-15° C. to extract unextracted ground roasted coffee.

375J. Process of preparing coffee extract.

BACOT, P. A. Assignor to Societe Immobiliere & Financiere du Parc. 2,522,014, Sept. 12, 1950.

In the production of a coffee extract, the steps of distilling an aqueous suspension of ground, roasted coffee beans under a sub-atmospheric pressure, at a temperature not above 42° C., thus producing vapors; condensing vapors until a weight of condensed liquid substantially equal to the weight of starting coffee has been collected and thereupon terminating distillation; and extracting the remainder of aqueous suspension with water at a temperature of about 90-95° C.

376J. Method of making water-soluble coffee extract.

SCHAEPPI, J. H. MITLODI, AND MOSIMANN, W. 2,518,441, Aug. 15, 1950.

In a process of making a dehydrated water-soluble coffee-extract, the steps comprising extracting roasted and ground coffee at a temperature not exceeding 100° C. with water containing a sufficient amount of a substance capable of binding and precipitating the albuminous and albuminlike substances which would impair the taste of the dehydrated extract, said binding and precipitating substances being selected from the group consisting of calcium hydroxide and calcium oxide, filtering said extract, adding to the filtered solution a mixture comprising lactose and gum-arabic as an aroma-retaining medium in an amount of 40 to 60% based on the total weight of the final dehydrated extract, adjusting the pH value of said solution to within a range between 4.7 and 5.4 by addition of an innocuous organic acid selected from the group consisting of tartaric acid and citric acid, thereafter dehydrating said solution and admixing the dry dehydrated extract powder with 0.4-0.8% of its total weight of an aromatic oil, obtained by squeezing roasted coffee powder.

ENRICHMENT

377J. Enriched foodstuffs.

STIEVATER, JR., L., AND STECHER, P. Assignors to Merck & Co., Inc. 2,508,477, May 23, 1950.

The process of enriching a granular foodstuff with riboflavin, thiamin, niacin and an iron salt which comprises applying to the granules a fluid mixture of riboflavin, abietic acid and acetone and evaporating the acetone to form a coating on the granules consisting of riboflavin suspended in abietic acid, then applying to the granules a fluid mixture of thiamin, niacin, and iron salt, zein, acetone and water and evaporating the water and acetone to form a second coating on the granules consisting of thiamin, niacin and an iron salt, suspended in zein, and finally applying to the granules a fluid mixture of abietic acid and acetone and evaporating the acetone to form an outer coating of abietic acid on the granules.

FATS AND ANTIOXIDANTS

378J. Shortening.

NORTH, G. C., ALTON, A. J., AND BROWN, W. C. Assignors to Beatrice Creamery Co. 2,520,954, Sept. 5, 1950.

A powdered shortening comprising a shortening fat core, a hull of milk solids not fat, and egg substance selected from the group consisting of whole egg and egg yolk, the fat present including shortening fat and egg fat being between 50 and 80 parts, and the amount of egg yolk present in the egg substance being between 10 and 30 parts.

379J. Process of producing an antioxidant concentrate.

BUXTON, L. O. Assignor to Nopco Chemical Co. 2,515,858, July 18, 1950.

In a process for producing an antioxidant concentrate, the steps comprising contacting a crude vegetable oil with ammonia, contacting the ammonia-treated oil with a solvent substantially miscible with fatty materials at room temperature and only partially miscible therewith at temperature somewhat below room temperature, and separating a solvent solution containing a highly active antioxidant extract from the oil immiscible with the solvent at the temperature somewhat below room temperature.

380J. Process of producing an antioxidant concentrate.

BUXTON, L. O. Assignor to Nopco Chemical Co. 2,515,859, July 18, 1950.

In a process for producing an antioxidant concentrate, the steps comprising contacting the ammonia-treated oil with a solvent selected from the group consisting of methanol and ethanol, and separating a solvent containing a highly active antioxidant extract from the oil.

381J. Process of producing an antioxidant concentrate.

BUXTON, L. O. Assignor to Nopco Chemical Co. 2,515,860, July 18, 1950.

In a process for producing an antioxidant concentrate, the steps comprising contacting a crude vegetable oil with ammonia, contacting the ammonia-treated oil with a highly polar solvent selected from the group consisting of isopropyl alcohol, n-propyl alcohol, acetone, diacetone alcohol, ethyl acetate, methyl acetate, and methyl ethyl ketone, said solvents containing at least 10% of water, and separating a solvent solution containing a highly active antioxidant extract from the oil.

382J. Synergistic antioxidant containing amino acids.

HALL, L. A. Assignor to The Griffith Laboratories, Inc. 2,518,233, Aug. 8, 1950.

A fatty composition consisting predominantly of glycerides of fatty acid and containing not substantially more than 0.25% of an antioxidant composition comprising a synergistic mixture of an amino acid compound of the class consisting of glycine, threonine, phenylalanine, arginine, methionine, tryptophane, tyrosine, butyl tyrosine, and alanine; a gallic acid ester and an organic acid of the class consisting of benzoic, fumaric, tartaric and citric.

383J. Antioxidant.

KRAYBILL, H. R., AND BEADLE, B. W. Assignors to Brickman, A. W. 2,521,856, Sept. 12, 1950.

A material normally subject to the deteriorating effect of oxidative rancidity due to its content of glycerides of fatty acids, stabilized by the presence of (a) from .01 to .02% by weight based on the glyceride content of tertiary butylated hydroquinone monoalkyl ether wherein the alkyl group contains from 1 to 4 carbon atoms inclusive; (b) from .002 to .005% by weight of hydroquinone, (c) from .002 to .005% by weight of an acidic material selected from the group consisting of citric acid, ascorbic acid, oxalic acid, phosphoric acid, ethyl acid phosphate and triethyl phosphate.

FISH PRODUCTS

384J. Fish protein and mineral product.

PARGENTJEV, I. A. 2,512,375, June 20, 1950.

The method of treating fish body material containing fish bones which comprises grinding such material and forming the ground material into an aqueous liquid mash capable of being stirred, admixing the ground material with a mineral acid, stirring the resulting mixture and continuing the acid treatment until the fish body pieces are broken up and the bones dissolved and a homogenized mixture is obtained discontinuing the acid treatment before the fish protein is substantially hydrolyzed

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and while the homogenized mixture contains freed fish oils and the fish protein mainly is in the form of acid-insoluble finely divided protein in suspension in an aqueous acid solution of salts resulting from the dissolving of the bones and of soluble nitrogen compounds, and separating from the homogenized mixture a product containing the acid-insoluble protein. A fish protein and mineral product resulting from the limited acid treatment of fish body material including fish bones sufficient to dissolve the fish bones and convert the fish proteins mainly into the form of an acid-insoluble finely divided protein, said product being made up principally of fine particles of acid-modified fish proteins having an acid reaction and being insoluble in dilute acid solution, and a small but substantial amount of readily digestible acid solubilized fish bones intimately admixed therewith, and said product containing enzymes and vitamin B complex.

385J. Process and apparatus for producing oil from fish liver.

SARLAND, K. L. Assignor to Aktiebolaget Separator. 2,507,614. May 16, 1950.

In the treatment of fish liver the process which comprises subjecting a liver mass to a series of successive disintegration actions to disintegrate the liver and remove tendons or connective tissue therefrom, by confining and rotating a mass of the liver about a vertical axis in a primary zone while partially obstructing the mass rotation to cause the inner portion of the mass to rotate at a lower speed than the outer surface of the mass, scraping and cutting off small pieces of the mass near outer surface during rotation and while discharging disintegrated liver from the outer surface of the rotating mass through a plurality of relatively large paths into a secondary zone surrounding first zone, retaining the coarser separated tendon material in primary zone, effecting a similar obstructed rotation of the mass in said secondary zone concurrently with the obstructed rotation in the first zone, and subjecting secondary rotating mass to a finer scraping and cutting near its outer surface while discharging finely disintegrated liver outwardly therefrom through a plurality of paths smaller than first paths.

386J. Machine for conditioning shrimp.

SWINDEN, R. K. 2,515,101. July 11, 1950.

In a machine for conditioning shrimp, a rotatable cutter assembly comprising circular guide discs, a pair of disc-like cutters between discs and a spacer between cutters to space the cutters apart, the margins of the discs converging inwardly to the cutters to guide the shrimp with respect to cutters, cutters terminating in sharp cutting edges which extend out beyond the margins of the discs.

FLAVORS

387J. Process for recovering volatile flavors.

MILLEVILLE, H. P. Assignor of fifty percent to D. K. Tressler. 2,513,813. July 4, 1950.

The process of obtaining a concentrated solution of volatile components from solutions containing such volatiles which consists in passing the solution into the stripping section of a fractionating column while causing a stream of steam to ascend from the lower end of the column to strip the volatiles from the solution, withdrawing the vaporized product from the upper end of the rectifying section of the column and condensing such vapors, passing the non-condensible gases into a scrubbing tower, contacting such gases by a stream of water to absorb the volatile components from the gases, returning such volatile components to the system, and recirculating the condensed vapors through the rectifying section until a desired concentration has been reached.

388J. Flavor developing composition.

SABINE, D. B. Assignor to The Arlington Chemical Company. 2,512,385. June 20, 1950.

A composition of matter, for developing the flavor of food products, comprising a mixture of ammonium glutamate and glutamic acid, the glutamic acid serving to increase the flavor developing property to a level above that for ammonium glutamate alone and above that for glutamic acid alone, the proportion of glutamic acid being 10 to 100 parts for 100 of ammonium glutamate.

FREEZING

389J. Rapid freeze process for food products.

GORTON, JR., T. S. 2,522,221, Sept. 12, 1950.

The method of producing a quick frozen food product in package form which comprises, preforming a container consisting of thin ice walls having smooth inner surfaces, cooling walls to a temperature substantially below the freezing point of water, packing container only with a solid food product to bring the solid food in direct and intimate contact with prefrozen inner surfaces of the container, and then subjecting the so packed container to a quick freezing temperature appropriate to the food to be frozen to quick freeze the contents and to characteristically unite the surfaces of the contents which are in contact with pre-frozen smooth walls to walls by the initial transfer of heat to the frozen walls from the food and the subsequently applied quick freezing temperature to form a unitary package the thin ice walls of which are refrigerated by frozen contents.

FRUIT AND FRUIT JUICES

390J. Method of preparing products for storage and packaged products produced thereby.

COTTON, R. H., AND SCHROEDER, A. L. Assignors to National Research Corp. 2,520,878, Aug. 29, 1950.

The process of preparing citrus fruit juice for storage which comprises subjecting the juice to vacuum desiccation until it is reduced to a solid powder having a moisture content of from 2% to 5% by weight, then hermetically sealing powder in a container free from moisture vapor, together with a desiccant exposed in moisture-absorptive relation to powder but out of physical contact therewith, desiccant acting during long periods of storage to effect removal and absorption of further moisture from powder and to preserve powder against chemical deterioration and caking which would otherwise take place in storage of container at normal temperature.

391J. Citrus fruit product.

BRUCE, J. A. 2,509,904, May 30, 1950.

A citrus fruit product comprising disintegrated meat of citrus fruit segments in thick suspension in citrus juice, disintegrated meat predominantly consisting of individual meat cells and including both intact meat cells and ruptured meat cells.

392J. Citrus juice and removal of volatile oils therefrom.

PULLEY, G. N., AND VELDHUIS, M. K. Assignors to the United States Government. 2,510,138, June 6, 1950.

A method of simultaneously pasteurizing citrus fruit juice and removing volatile oil therefrom comprising rapidly heating raw citrus fruit juice containing volatile oil to a boiling temperature at substantially atmospheric pressure to evaporate from 0.5 to 5% of the juice by passing the juice through a tubular heater, then passing the juice through a chamber in which the juice is held not less than 3 seconds to allow the vapor to bubble through the juice, whereby more of the volatile oil vaporizes from the juice into the bubbles of vapor, and then separating the vapor containing the volatile oil from the liquid juice.

393J. Process of extracting and preserving the original flavors and food value of fruit juices.

HUZENLAUB, E. G. 2,517,569, Aug. 8, 1950.

The method of extracting fruit and vegetable juices and preserving the original flavors and food values thereof which comprises, cutting the foodstuff into strips under a high vacuum, squeezing the juice from the pulp without substantially disintegrating the pulp and skins, separating the juice from the waste skin strips, pulp and any seeds, discharging waste, the skin strips serving as packing means during the discharging step to prevent lessening of the vacuum, and the vacuum serving to extract air dispersed in the juice and to prevent air from later coming in contact therewith, forming, under the same high vacuum, a moving column of juice, column comprising at a

Abstracts

given moment an upper portion, an intermedite portion and a lower portion, the upper portion comprising a volume at least about six times the volume of the intermediate portion, heating intermediate portion of juice to sterilize the same, permitting any vapor formed during the heating step to condense in the juice comprising upper portion, introducing sterilized and cooled juice from the lower portion of the column into a container and sealing the juice therein, permitting heated juice in the intermediate portion to form a succeeding lower portion and cooling the same, replacing the theretofore intermediate portion of juice by juice from the upper portion, replenishing the upper portion with new juice, and repeating the foregoing steps, protecting the juice against contact with air and oxidizing material at all times from the beginning of the extracting operation until the sealed containers are opened.

394J. Methods of drying foods.

KETCHAM, E. K., MAY, C. F., AND JAGOW, E. E. Assignors, by mesne assignments, to Vacu-Dry Co. 2,522,276. Sept. 12, 1950.

In the process of dehydrating fruits and vegetables wherein the moisture content of the particles is reduced to a maximum of 3% in a sealed vessel with the final drying being accomplished under vacuum of the order of 28½ in. of mercury and with controlled heat, at the conclusion thereof the steps of suddenly restoring atmospheric pressure within the sealed vessel, and thereafter rapidly establishing a pressure within vessel of at least one atmosphere to collapse the particles.

NUTS

395J. Aqueous nut emulsion.

MITCHELL, JR., J. H. Assignor to Stevens Industries, Inc. 2,511,119. June 13, 1950.

An aqueous nut emulsion comprising one part by weight of nut particles suspended in nut oil, said particles being of such size that at least 85% by weight thereof will pass through a standard 325-mesh sieve, while at least 90% will also pass through a standard 200-mesh sieve, and from about one to about ten parts by weight of water.

396J. Stabilized nut butter.

VINCENT, J. F. Assignor to Stevens Industries, Inc. 2,511,136. June 13, 1950.

An improved nut butter comprising a stable, homogeneous mixture of comminuted nuts, an alkalinizing agent in an amount sufficient to impart to said mixture a pH of about 6.5 to about 7.5 and more than 0.2% by weight of the product of a fatty additive of the group consisting of fatty acids of the C_{16} to C_{18} series and fats composed primarily of glycerides of such acids.

PECTIN

397J. Coating of foods with pectinate films.

OWENS, H. S., AND SCHULTZ, T. H. Assignors to the United States of America. 2,517,595. Aug. 8, 1950.

A food package comprising a food encased in an edible envelope of a calcium-alkali pectinate film, said pectinate being derived from pectinic acid having a methoxyl content from 3 to 8%.

STARCH

398J. Starch modification process.

HANSEN, D. W. Assignor to A. E. Staley Manufacturing Company. 2,514,055. July 4, 1950.

In the preparation of thin boiling starch from native starch which comprises contacting the native starch with an aqueous mixture of a mineral acid and hexavalent chromium at a temperature below the pasting temperature of the starch in contact with aqueous mixture and for a time sufficient to increase the alkali fluidity of the contacted starch substantially above the alkali fluidity of the native starch, the improvement which comprises separating the contacted starch from the aqueous solution containing chromium ion, whereby subsequent alkalizing of starch fails to cause appreciable greenish discoloration thereof due to the presence of chromium ion, and thereafter bringing the starch into contact with an alkaline material under such conditions that the starch granules have a pH of not less than about 8, as indicated by the pH of a slurry of the granules in water alone, and are not substantially pasted thereby.

399J. Process of fractionating starch.

SCHOCH, T. J. Assignor to Corn Products Refining Company. 2,515,095. July 4, 1950.

The process of fractionating starch into its A- and B-fractions which comprises effecting a solution of starch, at elevated temperature, in a mixture of water and aliphatic alcohol, cooling the solution to a sufficiently low temperature to effect precipitation of the A-fraction separating the A-fraction, cooling the solution remaining after removal of A-fraction to a sufficiently low temperature to effect precipitation of the B-fraction and separating the B-fraction; alcohol containing from 1 to 5 atoms of carbon and capable of being dissolved in the aqueous phase of mixture to the extent of about 10 to 15 volume % at 0° C. and being present in the system to the extent of about 10 to about 35% of the volume of mixture; the concentration of starch in solution not exceeding about 7%.

400J. Process of fractionating starch.

SCHOCH, T. J. Assignor to Corn Products Refining Company. 2,515,096. July 11, 1950.

The process of fractionating a material from the group consisting of thin boiling starches and white dextrines into its A- and B-fractions, which comprises effecting a solution of material at elevated temperature in a mixture of water and aliphatic alcohol, cooling the solution to a sufficiently low temperature to effect precipitation of the A-fraction, separating the A-fraction, cooling the solution remaining after removal of A-fraction to a sufficiently low temperature to effect precipitation of the B-fraction and separating the B-fraction; alcohol containing from 1 to 5 atoms of carbon and capable of being dissolved in the aqueous phase of mixture to the extent of about 10 to 15 volume % at 0° C. and being present in the system to the extent of about 10 to about 35% of the volume of mixture; the concentration of material in solution not exceeding about 17%.

VEGETABLES

401J. Desulfurization of vegetable foodstuffs.

FLANZY, M. P. P. Assignor to J. M. L. P. Fabre. 2,509,633, May 30, 1950.

A desulfurizing process for vegetables which have been subjected to the action of a sulfurous agent comprising the steps of heating a mass of products to a temperature sufficient to drive off the sulfurous agent; bringing the vapors generated thereby in contact with a relatively cold surface while permitting them to expand; collecting the condensate; and passing it back into the mass of products while substantially keeping it out of contact with vapors.

402J. Treatment of vegetable matter preparatory to dehydration.

BIRDSEYE, C. Assignor to Dehydration, Inc. 2,509,719, May 30, 1950.

In a vegetable dehydration process, the steps of blanching units of vegetable tissue to inactivate their enzyme content, partially dehydrating the units, adding a plasticizing agent to the units and further dehydrating the units with the plasticizer contained therein.

403J. Method of making food products.

ALEXANDER, J. B. 2,512,591, June 27, 1950.

The method of producing a food product which comprises, slicing potatoes, depositing slices of carrot on the potato slices, exerting pressure on the slices to force them into contact and immersing in a hot cooking fluid while held in assembled relation, whereby adherence is effected.

(Continued on page 13 following technical papers)

Abstracts

(Continued from page 13)

404J. Process of treating legumes to enhance coloration preparatory to freezing.

KENWORTHY, JR., J. R. Assignor to John Inglis Frozen Foods Co. 2,520,214, Aug. 29, 1950.

That method preparing fresh vegetables for freezing comprising: immersing the vegetables in an approximately 1% solution of sodium hydroxide for approximately 1 minute at a temperature of the order of 65° to 70° F., removing them from the solution and immediately rinsing them in clear water of a relatively cool temperature.

405J. Process of preparing peanuts.

WHITEHEAD, W. L. 2,510,534, June 6, 1950.

A process of cooking, salting and storing green unshelled peanuts wherein the unshelled peanuts will be cooked, salted and maintained in an edible condition over long periods of time, which includes the steps of placing washed green unshelled peanuts in a container, adding salt water to the container in a quantity sufficient to cover the peanuts, closing and sealing the container, heating the container to boil the salt water while the container is maintained in a sealed condition for a sufficient length of time to cook the unshelled green peanuts, thereafter permitting the peanuts and salt water to cool and maintaining the cooked unshelled peanuts and salt water in said container while said container is maintained in a sealed condition until the peanuts are ready for consumption.

406J. Process of pretreating vegetable materials.

MUIDERBERG, L. V., AND JANSEN, A. W. Assignors to Central Bureau van de Tuinbouwveilingen in Nederland. 2 515,025. July 11, 1950.

A method of blanching humid vegetable materials prior to their preservation comprising continuously circulating through the materials a closed humid air stream at a normal pressure which air stream has been heated to effect its dehumidification, humidifying the air stream by the moisture evaporated from the materials under treatment and controlling the heating and the humidification of continuous air stream to maintain its wet bulb temperature at a range between above 65° and below 100° C.

IOWA GROWS ONE-TENTH OF THE WORLD'S CORN

The USDA has just taken its annual look around the world, the *Bulletin* reminds us, to see how big the current global corn crop will be. Estimates of southern hemisphere corn, now being harvested, are added to known totals for the northern hemisphere in computing the 1949-50 world crop. To date, in that part of the world still outside the Iron Curtain and hence still open to the light of truth and the impartial appraisals of the statisticians, the picture looks like this:

North America	3,535,000,000 bushels
Europe	660,000,000 bushels
Asia	595,000,000 bushels
Africa	245,000,000 bushels
South America	365,000,000 bushels
Other	150,000,000 bushels
Total	5,550,000,000 bushels

Since Iowa's own native corn pickers threw some 553,847,000 bushels of corn into the world's hoppers last fall, the state must be credited with one-tenth of the total corn productivity of the globe.—(From the Corn Inds. Research Foundation's *Corn*, 6 [2], [1950].)

WHY SOME SALT MAKES A GOOD MIXER!

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Membership

Write to nearest regional secretary, if within an area covered by a regional section, or to the Executive Secretary of the Institute, for an application form and information regarding qualifications and classifications.

Regional Section News

(Continued from page 4 preceding technical papers)

"Recent Developments on Vitamin B_{12} and the Animal Protein Factor." G. P. Whitlock, Research Department, Merck and Co., Rahway, N. J.

The evening address was given by Herbert T. Holbrook, Sales Manager, Standard Cap and Seal Corporation, N. Y. His subject: "Recent Developments in Food Packaging." Prior to the evening meeting a dinner was held at the Country Club.

Those desiring to do so, were given the opportunity of visiting the Post and Kellogg plants.

PRESIDENT PAUL F. SHARP ANNOUNCES FURTHER COMMITTEES FOR THE YEAR

Some of the Committees appointed by President Sharp were listed in the August, 1950 issue. The following additional Committees have been recently announced:

1. *Committee on Food Industries Award:* Samuel C. Prescott, Chairman; E. A. Beavens, Clifford L. Bedford, W. V. Cruess, Howard C. Douglas, Arthur W. Farrall, C. R. Fellers, Ernest A. Fieger, William F. Geddes, David B. Hand, Ira A. Gould, Jr., B. L. Herrington, M. E. Highlands, Louis B. Howard, Walter A. Maclinn, John R. Matchett, Emil M. Mrak, John E. Nicholas, Milton E. Parker, Bernard E. Proctor, H. A. Schuette, John A. Shellenberger, George F. Stewart, Ernest H. Wiegand, Jasper G. Woodroof, W. R. Woolrich.

2. *Committee on Chemicals in Foods:* B. E. Proctor, Chairman; F. C. Blanck, Charles N. Frey, M. A. Joslyn, Charles W. Kaufman, Frank C. Lamb, Homer E. Whitmire.

3. *Committee on Citrus Products:* W. E. Baier, Chairman; E. A. Beavens, Charles H. Brokaw, E. J. Cameron, Horace Campbell, Raymond E. Cox, Adams W. Dutcher, Kenneth G. Dykstra, Ellis R. Fehlberg, John L. Heid, Chester W. Lindsay, Emil M. Mrak, William C. Platt, Vernon C. Praschan, Wallace R. Roy.

4. *Committee on Frozen Foods:* Ernest H. Wiegand, Chairman; H. C. Diehl, Wm. J. Finnegan, G. A. Fitzgerald, Louis B. Howard, Frank A. Lee, Herbert S. Madsen, Daniel G. Sorber, Gladys E. Vail, Jasper G. Woodroof.

5. *Committee on Pectin Standardization:* Dr. John J. Willaman, Chairman; George L. Baker, J. J. R. Bristow, Glenn H. Joseph, Charles Kaufman, Z. I. Kertesz, Louis J. Lataillade, W. D. Maclay, E. Everett Meschter, H. H. Mottern, Wm. A. Rooker, W. Lowe Walde.

6. *Committee on Taste Testing and Consumer Preference:* Dr. Emil M. Mrak, Chairman; E. C. Crocker, Harry L. Fevold, Helen Louise Hanson, Ernest E. Lockhart, Belle Lowe, Roy E. Morse, M. E. Pennington, Vernon M. White, Virgil O. Wodicka.

PERSONNEL

M. STANLEY BARKER of Magnus, Mabee and Reynard, Inc., prominent New York and Chicago essential oil, drug and chemical house, has been promoted to field sales supervisor of that company. Mr. Barker will supervise all sales for Metropolitan New York, New Jersey and Connecticut.

S. S. EPSTEIN, chemist, vice president, Kirsch's Beverages, Brooklyn, N. Y., is one of the recipients of this year's Chesterman Award, made by the American Bottlers of Carbonated Beverages, for outstanding contribution to the industry.

GEORGE GELMAN, Technical Director of the Quartermaster Food and Container Institute for the Armed

Regional Section News

Forces has resigned to accept appointment as Vice-President of the Vico Products Co., Chicago, manufacturers of yeast, yeast derivatives, hydrolysates and vitamins. Mr. Gelman received his bachelor's degree from the University of Chicago, and also a Master of Business Administration; he received his doctorate in jurisprudence from De Paul University. He was formerly staff chemist and bacteriologist, first with Wahl-Henius Insitute, Chicago, and later staff chemist and bacteriologist at the Edwal Laboratories, Chicago. A veteran of World War II, Mr. Gelman entered the service as a Second Lieutenant, Chemical Warfare Service, in 1942 and was assigned to the Quartermaster Food and Container Institute as assistant to the officer in charge of the Technical Branch, and later as officer in charge of planning. At his separation from the service he held the rank of major, QM-Reserve. He is a member of the American Chemical Society, a Fellow of the American Institute of Chemists, member of the Chicago Chemists Club, Institute of Food Ttechnologists and the American Association for the Advancement of Science.

WILLIAM R. JOHNSTON, formerly director of research, Standard Brands, has been appointed vice president in charge of research. Dr. Johnston received his bachelor's degree in 1930 from Washington State College (Seattle), and in 1933 his doctorate in physical chemistry from Johns Hopkins. He has been connected with Standard Brands since 1933.

CHARLES W. KAUFMAN has been appointed Executive Director of Research, Kraft Foods Co. His headquarters will be in Chicago at the main offices of Kraft. Mr. Kaufman, who has had broad experience in food research, will be responsible for the executive direction of all research activities of Kraft, including their new laboratories at Glenview, Illinois. A graduate of Washington and Lee University, Mr. Kaufman carried on graduate work at the University of California and the University of West Virginia. He is a member of the American Chemical Society, Institute of Food Technologists, Chemists Club of New York and the New York Academy of Sciences.

PERCY C. MAGNUS, president of Magnus, Mabee & Reynard, Inc., of New York, dealers in drugs, chemicals and essential oils, has been appointed chairman of the Essential Oils and Related Groups for the Greater New York Citizens Committee for the Hoover Report.

In this office he will enlist support to further the educational program for adoption of the recommendations of the bipartisan Hoover Commission for organization of the executive branch of the government.

JAMES McGOWAN, JR., president, Campbell Soup Co., has been elected Chairman of the Board of that company.

ROY E. MARSHALL has been named Assistant Director, Michigan State College Agricultural Experiment Station, East Lansing.

ROY E. MORSE of Monsanto Chemical Company's food technology laboratory at Anniston, Ala., has been made research group leader of the laboratory. He will be in charge of the food technology and baking labora-

(Continued on page 17)

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N.C.A. "TOMATO PRODUCTS" BULLETIN IN NEW EDITION

The red booklet on "Tomato Products" (27-L) of the National Canners' Association has been for many years one of the most popular laboratory bulletins in the tomato processing industries. This publication played an important part in the general application and standardization of production and quality control methods. It is news, therefore, that a new revised edition of this bulletin has been just released by the Research Laboratories of N.C.A. The 80-page booklet now includes a section on tomato juice in addition to those dealing with tomato pulp or purée, tomato paste, catsup, and chili sauce.

W. D. Bigelow, H. R. Smith, C. A. Greenleaf, C. W. Bohrer and J. M. Reed are listed as authors in this edition.

Inquiries concerning the bulletin should be addressed to the National Canners' Association, 1133 20th Street, N. W., Washington 6, D. C.

NATIONAL SCIENTIFIC REGISTER

Did You Read Page 16 November Food Technology?

The questionnaire check list for Food Technologists was prepared by a committee of nine I. F. T. members headed by Dr. B. S. Clark. It has been approved by the National Research Council and Federal Security Agency, and has gone to the printer. Registration forms and check lists will be mailed to Food Technologists about January 15th. My office will mail questionnaires to all I. F. T. members in the U. S. Many I. F. T. members will receive other questionnaires because of membership in other societies. Each individual decides how he wishes to register, i.e., as a chemist, biologist, physicist, etc., or as a Food Technologist. Having decided upon the category in which you wish to register, disregard other questionnaires. DO NOT REGISTER MORE THAN ONCE. Registration is open to both men and women.

Minimum qualifications for registration with the National Scientific Register:

FOOD TECHNOLOGISTS: At least a Bachelor's degree from a recognized educational institution in Food Technology or one of the sciences or branches of engineering concerned with Food Technology, plus three years experience in the application of this training in some phase of Food Technology. (This includes teaching.) The requirement for formal academic training may be waived in the case of an individual who, through long experience, has distinguished himself in the field of Food Technology.

For the purpose of this registration, Food Technology is defined as the application of science and/or engineering to the production, processing, packaging, distribution, preparation, or utilization of foods.

Members should bring to the attention of fellow scientists and technologists who are not members of the Institute, the importance of this registration, and request them to print name and address on a penny post card and send to my office. They will be placed on the list to receive a questionnaire.

CHARLES S. LAWRENCE
Executive Secretary
176 W. Adams Street
Chicago 3, Illinois

Advertisers' Index

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FUTURE DATES FOR FOOD TECHNOLOGISTS

1951

February 11. Annual Meeting, National Egg Products Association, Kansas City, Mo.

February 17-23. Annual Convention, National Canners Association, National Food Brokers Association, Canning Machinery and Supplies Association, Chicago, Ill.

February 27-March 2. National Frozen Food Industry Convention, San Francisco, Calif.

May. International Canning Conference, Paris.

June 9-15. International Food Exposition, Chicago, Ill.

June 17-20. **Eleventh Annual Meeting, Institute of Food Technologists, New York, N. Y.**

August 2-September 11. Eighth International Congress of Refrigeration, London.

September 26-29. International Association of Milk and Food Sanitarians, Glenwood Springs, Colo.

(EDITOR'S NOTE: Starting with this issue, FOOD TECHNOLOGY will carry a list of future dates of national and international meetings, conventions, and exhibits of interest to food technologists. Information concerning such dates should be sent to the editor.)

FLAMMABLE OR INFLAMMABLE?

Considerable progress can be observed in the increasing acceptance of the term "flammable" in place of the older yet at times confusing expression "inflammable." Many organizations have now adopted "flammable" to designate materials that are easily ignited and burn with unusual rapidity.

As stated by the National Fire Protection Association in *Fire News*, the term "flammable" is used in place of inflammable in Chapter 39 of Public Law 772 (80th Congress, Section 835, Approved June 25, 1948, Effective September 1, 1948) with reference to Interstate Commerce Commission regulatory powers. The Civic Aeronautics Board also applied the word "flammable" in the text of a regulation in 1949.

NEW PRINCIPLE USED IN RECORDING HYGROMETER

An instrument recently produced by a London firm utilizes a novel method of dew-point measurement which enables it to operate automatically and continuously and to provide, if required, a continuous chart record of dewpoint. A particular value of this hygrometer is that it will measure very dry air with "dew-points" or frost-points much below 0° C. Two types are available, one for meteorological purposes and the other, which is of most interest to physicists and chemists, for industrial purposes, though both types are similar in principle.

A jet of air (or gas sample) is directed on the highly polished top surface of a thimble which is continuously cooled by contact with a copper block which forms part of a refrigerator system. Light from a lamp and lens system is directed obliquely on the top of the thimble. Dew formation is detected by two photocells, one adjacent to and illuminated by the lamp and the other so placed that it is unaffected by reflected light so long as the top of the thimble remains clear, but receives scattered light when dew or frost forms.

A thermocouple is embodied in the thimble and connected to a second magnetic amplifier from which sufficient power is derived to operate an indicating instrument and direct-writing recorder.

The entire appartus is self-contained and housed in a cabinet with its own refrigerator for cooling the copper block. Unit construction of the various components, such as amplifiers, and plug and socket connections, have been used throughout in the interests of simplified maintenance.—(From *World Refrig.*, **1** [1], 32, [1950].)

THE FISHING INDUSTRY IN BRAZIL

Fishing in Brazil is little developed as an industry, and is of relatively small economic importance. There is much subsistence fishing, wherever there is water; but fish is imported into all parts of Brazil, both canned and salted. The value of fish caught in Brazil in 1942 amounts to less than one-half of one percent of the Brazilian national income for 1942, and to about one-tenth of the value of U. S. fisheries products in 1939.

Primitive methods of fishing prevail throughout the country. The tropical coasts abound with fish, but the varieties are so numerous that large schools of a single species are rarely encountered; thus it is difficult if not impossible to employ large-scale methods. In the sub-tropical waters off the southern coasts, roughly from the Federal District to the Uruguayan border, it is possible to use the trawler and purse seine which are found so profitable in the northern oceans. Such an industry would be based on sardines and shrimp.

Efforts to develop the fishing industry during the past ten years have been sporadic and, usually, fruitless. The number of motor-powered fishing boats is small and so is the average horsepower of their engines. Few of them have any refrigerating equipment, and fuel is expensive.—(Fisheries Leaflet 329, from *Com. Fisheries Rev.*, **12** [6], 67 [1950]).

Regional Section News

(Continued from page 15)

tories. Dr. Morse was formerly professor of food technology at the University of Georgia.

GEORGE T. PECKHAM, JR., Research Director, Clinton Industries, Clinton, Iowa, is the new chairman for the Division of Sugar Chemistry and Technology of the American Chemical Society.

B. E. PROCTOR, professor of food technology and Director, Samuel Cates Prescott Laboratories of Food Technology, Massachusetts Institute of Technology, is the new Chairman of the Division of Agricultural Chemistry of the American Chemical Society.

NECROLOGY

BENJAMIN LEVIN, bottler of carbonated beverages, died recently at Orlando, Florida.

JOHN JOSEPH AUSTIN, JR., Secretary of the Northeast Section of the Institute for the past five years, died on April 2, 1950. He was 39 years old. Mr. Austin received his formal training at Lowell Textile Institute, Boston University and the Massachusetts Institute of Technology. He was associated with Dewey and Almy Chemical Co., until a few years ago when he started his own company, Austin Industries, at Sudbury, Mass. This company sold adhesives, plastics, machinery and many other materials required in packaging, and was becoming well known in the field of packaging development.

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Available in 1 gallon glass jugs and 5 gallon clay jugs; also in 5, 10, 15, 30 and 50 gallon barrels.

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WORLD WHEAT SITUATION

This summary statement is based on extracts from a paper on the world wheat situation prepared for the Third Session of the International Wheat Council, held in London in June 1950, by the Grain Section, Distribution Division, FAO and printed in the Monthly Bulletin of the FAO, Vol. 3, No. 7 (July) 1950.

The month of June is a difficult time to review the world wheat situation. June represents the closing period for one crop year, while it is still a little too early to say very much about the next crop season. At the same time, this period does have the unique advantage of offering an opportunity to look rather usefully both backward and forward, often making it possible to draw some tentative conclusions that may be kept in mind until later information is available.

1949-50 Season

Looking backward on the 1949-50 season, which is based statistically on a July-June year, these features may be noted: (1) the 1949 world wheat area and production, like those of 1948, were above the levels of prewar (1934-38), with many importing countries, in particular, showing good harvest results; (2) the volume of world trade in wheat and flour was substantially reduced from the record figure reached in 1948-49; (3) carry-over supplies in the United States of America on 30 June 1950 are expected to show some gain over a year ago, but there appears in prospect little change in the total for the other three major exporting countries (Canada, Australia, and Argentina); (4) the level of free wheat prices (in U. S. dollars) has shown little net change from a year earlier; and (5) the International Wheat Agreement of 1949, in active operation during most of the season, has made wheat and flour available to member importing countries at a maximum price substantially below free market prices.

1950-51 Season

Looking ahead to the coming year, what significant developments now appear to be in prospect? While still too early to give definite quantitative estimates on production, the following general conclusions may be assumed on the basis of current information:

World wheat production in 1950 will be below the levels reached in each of the past two years—1949 and 1948. The 1 June estimate of the U. S. winter wheat crop was placed at 710 million bushels (19.3 million m.t.) as compared with 902 million (24.5 million m.t.) a year ago and a preliminary forecast of spring wheat at 234 million bushels (6.4 million m.t.) is down from last year's out-turn of 245 million (6.7 million m.t.). If these estimates are maintained, they would represent a total decrease in the U. S. crop of some 203 million bushels from last year (370 million bushels from 1948), an amount that is so large in the world total that it would seem unlikely to be offset by any prospective increases elsewhere. The indicated U. S. decrease from last year is approximately equal to the total out-turn of Australia or Argentina. Even so, the United States is expected to harvest about an average crop. The new Canadian crop is off to a rather late start and some reduction in seedings has been reported. While some sections have had normal, or above normal, rainfall to date, large areas still report below normal fall and spring precipitation that will require timely seasonal rains for a normal harvest again this year.

Early reports from Europe indicate a small net gain in the wheat area, with prospects mostly favorable to date. Having in mind the above-average or record yields for many countries during the past two seasons, however, it still seems premature to estimate how much, if any, further gain in the European wheat total may be recorded. The Soviet Union has reported a progressively larger wheat harvest in recent years, the 1949 acreage being above prewar levels. Further increases will probably depend to a large extent upon yields, which in turn are associated with seasonal weather conditions. The history of Soviet wheat production is characterized by fluctuations in yield resulting from the weather factor. For Asia, generally good harvests are reported for India and Pakistan, and prospects are better than a year ago in Turkey. On the other hand, for China, the principal producing country, many unofficial reports are not very optimistic. Large areas are indicated to have been experiencing famine conditions this season and seeding operations have had to be carried on under many difficulties. In the Southern Hemisphere a larger area has been called for in Argentina, guaranteed prices to producers who work their own farms being advanced to 28 pesos per 100 kilos (US $2.27 per bu.) as compared with 23.5 pesos (US $1.90 per bu.) this season. Whether or not the total Hemisphere harvest will show an increase will depend upon yields in both Argentina and Australia; the latter country harvested a near record crop in 1949 and a return to more normal yields would offset a substantial increase in Argentina.

On the basis of present crop prospects in the United States and expected utilization for 1950-51, the carry-over on 1 July 1951 seems likely to be reduced somewhat, possibly below the 400 million bushel mark. Unless above-average crops are harvested in the other three major exporting countries, the total for the four countries can also be expected to show some net decline, leaving any further increase in surpluses dependent upon the 1951 harvest (or a later one).

A DIGEST OF LABORATORY SAFETY PRACTICES

Article by James S. Sweely, of the Sun Oil Co. Research Laboratory, Norwood, Pa. Published in *Chemical and Engineering News* **27**, 52, 3861 (1949).
Abstracted by Martin Heerdt.

Goggles or eye shields should always be worn for personal protection in such operations as handling corrosive chemicals, explosives, vacuum distillations, high-pressure experiments, and shop work such as grinding. Rubber gloves and protective clothing are essential for work with corrosive chemicals; gas masks and respirators are necessary for hazardous atmospheres containing high concentrations of solvent vapors, dusts, and corrosive fumes.

Some precautions which can be recommended in the use of glass-

ware will reduce hazards to a minimum. Newly constructed glassware should be annealed and checked with polarized light before using, to detect dangerous strains. Tubing ends should be firepolished or ground and gloves used when inserting into stoppers. Avoid the use of cracked or chipped glassware, particularly flasks used in vacuum distillations. Glass tubes should extend well through rubber stoppers to avoid closure if the rubber swells. Heavy pieces of glass apparatus require the support of padded clamps and a ring stand or tripod.

For vacuum distillations a safety glass shield or protective screen as well as a large catch pan capable of holding the liquid volume involved should be used. Rubber stoppers used under vacuum must be large enough to prevent a suck-in. Vacuum dessicators as well as other vacuum equipment should be taped or suitably protected with shields. Permissible temperature and pressure ranges are necessary for safety in the use of such items as copper and saran tubing, iron pipe, metal cylinders, bombs, etc. Special precautions to be taken in the handling of compressed gas cylinders include hand truck transportation, use of the protective valve cap, vertical storage away from flammables, firm support, temperatures under 125° F., and use of a double valve pressure release device. Lubricants must not be used with oxygen valves; copper tubing should not be used with acetylene cylinders.

Good housekeeping has not been stressed sufficiently from the safety standpoint. Prompt cleanup of all spillages, keeping floors clear of samples, and disposal of broken apparatus all make for greater safety. Spilled mercury is very dangerous; all visible particles should be removed with a trapped suction device connected to an aspirator. The surrounding area should then be dusted with sulfur.

The usual precautions for handling reagents include working inside hoods with noxious materials; use of canvas bags or racks in transporting large bottles of acids, alkalies, etc.; prompt and proper labeling; and storage below eye level in the case of corrosive materials. Chemicals which are sufficiently hazardous to receive special mention can be classified as *corrosive chemicals* (acids, alkalies, aluminum chloride, hydrofluoric acid, phenol, phosphorus and phosphoric acids, sodium and potassium metal, and sulfonyl chloride), *poisons* (ammonia, aniline nitrobenzene, benzene, carbon disulfide, dimethyl sulfate, ether, fluorine, chlorine, bromine, iodine, hydrogen sulfide, hydrocyanic acid, cyanides, mercury, and phosgene) and *explosives* (chlorates, perchlorates, and benzoyl peroxide).

Several laboratories possess trained first aid squads composed of staff workers who handle all minor injuries on the spot. Fire drills, the correct manipulation of fire extinguishers, and the type of extinguisher to be used with various classes of fires should be a part of every safety training program. Smoking is usually permitted in designated areas except when flammables are being used. Safety matches are the only kind permitted in laboratories. At least two men are usually required to be in the laboratory if any experimental work is being done after the regular day. —*Commercial Fisheries Abstracts*, April, 1950.

WHAT'S THE TEMPERATURE?

Article by George E. Howard and E. J. Hanna of Application Engineering Department, Taylor Instrument Companies. Published in *National Provisioner* 122, 1, 14-15, 25 (January 7, 1950). Abstracted by Martin Heerdt.

The thermal or actuating system of a typical self-acting controller consists of three parts hermetically sealed together: the temperature-sensitive element or bulb, a capsular chamber or bellows, and the flexible tubing which joins them. The bulb is partially filled with a volatile liquid which when subjected to a temperature change produces pressure changes within the bellows, causing it to expand or contract. This movement is transmitted directly through a valve stem to the disc of the control valve which may be a single or double-sealed, direct or reverse-action valve.

Where more exact control of temperature is required, the use of an air-operated type of controller is necessary. Here the temperature-sensitive element actuates a small relay air valve which reduces a constant air supply of 20 to 25 pounds per square inch to some lower pressure depending on the temperature to which the bulb is subjected. This reduced presure is conveyed by copper tubing to the top of a diaphragm motor valve. The sensitivity of the air-operated controller may be changed by means of a simple adjustment to suit the requirements of the equipment being controlled. In summary, the air operated control system consists of the temperature controller which converts a change in temperature into a change in air pressure; and a diaphragm-operated control valve which functions in response to these pressure changes. A proportional response controller with automatic reset may be used in a continuous process. This type of controller corrects for load changes and returns the pen to the set point when such changes occur.

Self-acting controllers require maintenance. The packing in the valve stem stuffing box must be kept in good condition. When leaks cannot be stopped by a moderate amount of stuffing box nut adjustment, the valve should be repacked. Grease seal lubricators on valves so equipped should be given a one-quarter turn each week. If the packing is of the graphited rope type, the valve stem should be externally lubricated weekly with heavy oil. Preformed dry lubricated packing requires no auxiliary lubrication. The controller spring requires protection against external corrosion. Sharp bends in the connecting tubing must be avoided.

Procedure for repacking valves is as follows: Loosen the stuffing box nut, raise packing gland nut and remove all old packing. Use preformed graphite braided or a wick packing cut into short lengths equal to valve stem circumference; do not overpack. Now turn the stuffing box nut down as far as possible with the fingers and back it off slightly. Cause the stem to move up and down to check for free movement after repacking. If the valve is equipped with a grease seal lubri-

(Continued on page 20)

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Wanted, Chemist for food laboratory in small company manufacturing gelatin desserts, cake mixes, puddings, flavors, extracts, soup mixes, and specialty products. A man with creative ability preferred. Reply Box 119, Institute of Food Technologists, 176 W. Adams St., Chicago 3, Ill.

Wanted, Plant superintendent for small food manufacturing organization engaged in making food specialty items and employing approximately 60 to 100 people. Must have ability in scheduling work, keeping automatic machinery, and maintaining harmonious labor relations. Reply Box 120, Institute of Food Technologists, 176 W. Adams St., Chicago 3, Ill.

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Chemical Engineer, age 25, married, with two years' quality control experience with food processor, desires permanent position with food packer. Write Food Technology, 360 N. Michigan Ave., Chicago 1, Ill.

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What's the Temperature?

(Continued from page 19)

cator and was originally supplied with a pre-formed ring type of dry lubricating packing, new packing of the same size should be substituted. This usually necessitates disconnecting the stem. For this operation count the exposed threads on the stem so that it can be replaced in the original position.

Leakage of a single-seated valve with removable composition disc can be corrected by inverting the disc or replacing it. To obtain best results in repairing a double-seated valve, heat the body and disc to operating temperature before grinding with an abrasive grinding compound. Care should be exercised in reassembling so that the valve stem is of the original length. If there is no movement of the valve stem when the bulb is subjected to temperatures 15 degrees F. above and below the temperature which the instrument is set to control, the thermal element itself is inoperative, in which instance the entire instrument should be returned to the manufacturer.—*Commercial Fisheries Abstracts*, May, 1950.

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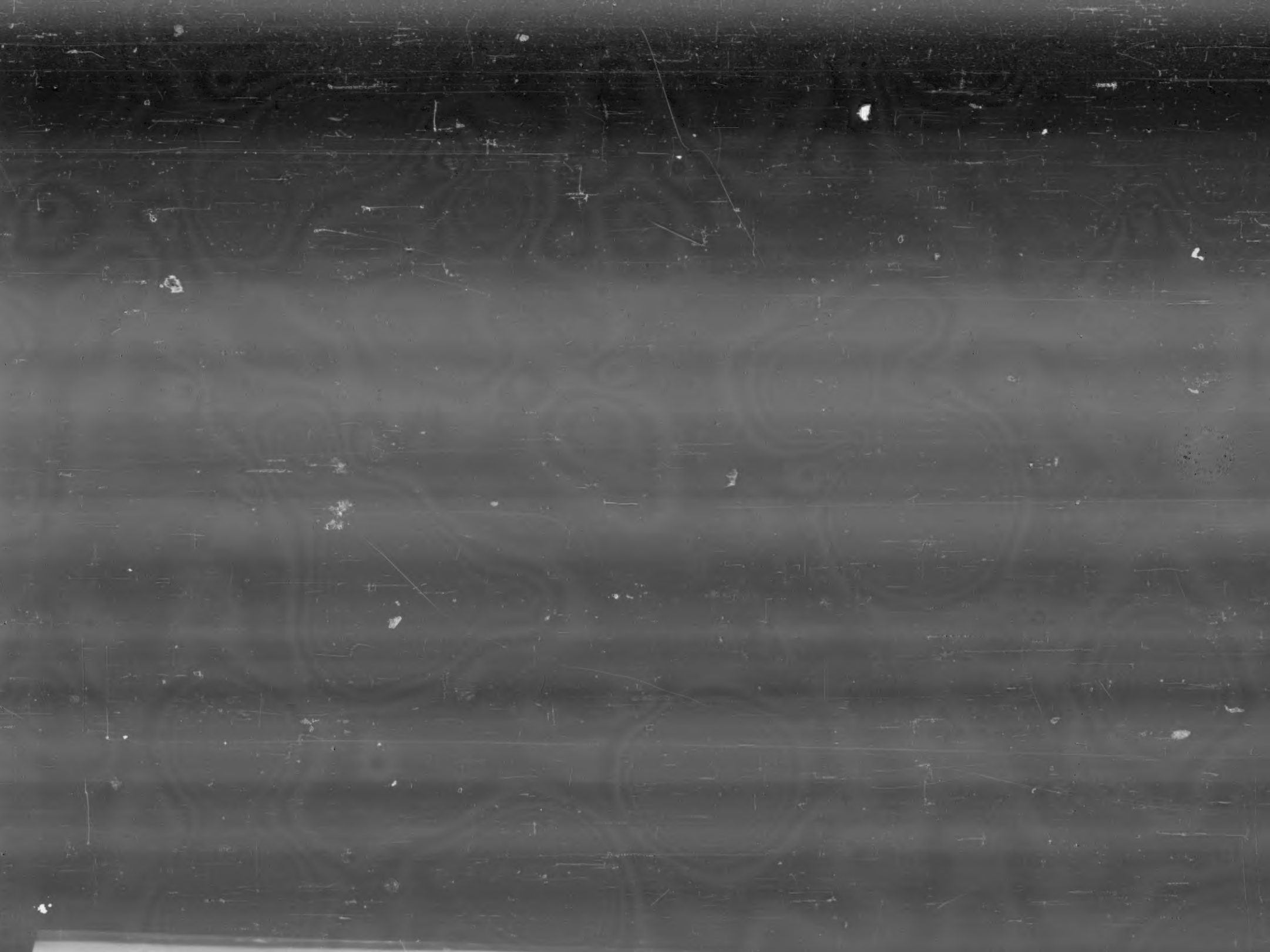
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